



PATENT APPLICATION  
PO-8155  
MD-04-18

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICATION OF	)	
EDWARD BROWNE	)	GROUP NO.: 1712
SERIAL NUMBER: 10/804,894	)	
FILED: MARCH 19, 2004	)	EXAMINER:
TITLE: STARTER FEED STREAM	)	MICHAEL J. FEELY
ACIDIFICATION IN DMC-	)	
CATALYZED PROCESS	)	

**APPEAL BRIEF UNDER 37 C.F.R. §1.192**

Mail Stop - Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 2231-1450

Sir:

The present Appeal Brief is submitted in support of the Notice of Appeal filed September 11, 2007.

**I. REAL PARTY IN INTEREST**

The real party in interest for the present Application Serial No. 10/804,894 is Bayer MaterialScience LLC of Pittsburgh, Pennsylvania, by virtue of the assignments executed April 14, 2004 and June 30, 2004.

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enveloped addressed to: Commissioner for Patents,  
Alexandria, VA 22313-1450

11/9/07  
Date

John E. Mrozinski, Jr. Reg. No. 46,179

Name of applicant, assignee or Registered Representative

Signature

November 9, 2007

Date

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## **II. RELATED APPEALS AND INTERFERENCES**

On September 11, 2007, a Notice of Appeal was filed in Application Serial No. 10/804,894. There are no pending appeals or interferences of which Appellant is aware that would be affected by or have a bearing on the Board's decision in this appeal.

## **III. STATUS OF THE CLAIMS**

Appellant herewith appeals the final rejection of Claims 1-16, 18, 19, 33 and 34. Claims 1-16, 18, 19, 33 and 34 are pending and stand rejected. Claims 17 and 20-32 have been canceled. A complete copy of the appealed claims is set forth in the Appendix.

## **IV. STATUS OF AMENDMENTS AFTER FINAL**

No Amendment under 37 CFR § 1.116 has been filed in the instant application.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

As recited in independent Claim 1, the present invention relates to a process for the polyoxyalkylation of a starter (found at page 7, lines 18-19) comprising establishing oxyalkylation conditions in an oxyalkylation reactor (found at page 7, lines 19-20) in the presence of a double metal cyanide (DMC) catalyst (found at page 7, lines 20-21); continuously introducing into the reactor at least one alkylene oxide (found at page 7, lines 21-22) and a low molecular weight starter (found at page 7, line 22) acidified with at least one of an inorganic protic mineral acid (found at page 7, lines 22-23) and an organic acid (found at page 7, line 23), wherein the acid comprises greater than 100 ppm, based on the weight of the starter (found at page 7, lines 24-25); and recovering an oxyalkylated low molecular weight starter polyether product (found at page 7, lines 25-26) having a number average molecular weight of about 260 Daltons (Da) to about 2,500 Da (found at page 10, line 4).

Further, as recited in independent Claim 33, the present invention also relates to an improved process of producing a polyurethane (found at page 17, line 3) by the reaction of at least one isocyanate (found at page 17, line 2) and at least one isocyanate reactive compound (found at page 17, lines 1-2), the improvement comprising producing the isocyanate reactive compound by establishing

oxyalkylation conditions in an oxyalkylation reactor (found at page 7, lines 19-20) in the presence of a double metal cyanide (DMC) catalyst (found at page 7, lines 20-21), continuously introducing into the reactor at least one alkylene oxide (found at page 7, lines 21-22) and a low molecular weight starter (found at page 7, line 22) acidified with at least one of an inorganic protic mineral acid (found at page 7, lines 22-23) and an organic acid (found at page 7, line 23), wherein the acid comprises in excess of 100 ppm, based on the weight of the low molecular weight starter (found at page 7, lines 24-25) and recovering an oxyalkylated low molecular weight starter polyether product (found at page 7, lines 25-26) having a number average molecular weight of about 260 Daltons (Da) to about 2,500 Da (found at page 10, line 4).

**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

1. Claims 1-10, 13-16, 18, 19, 33 and 34 stand rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 6,359,101 issued to O'Connor et al. With respect to this ground of rejection, Appellant admits that Claims 1-10, 13-16, 18, 19, 33 and 34 stand or fall together.
2. Claims 1-16, 18, 19, 33 and 34 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 6,077,978 issued to McDaniel et al. With respect to this ground of rejection, Appellant admits that Claims 1-16, 18, 19, 33 and 34 stand or fall together.
3. Claims 11 and 12 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 6,359,101 issued to O'Connor et al. in view of U.S. Pat. No. 6,077,978 issued to McDaniel et al. With respect to this ground of rejection, Appellant admits that Claims 11 and 12 stand or fall together.

**VII. ARGUMENT**

As will be set forth in detail below, Claims 1-10, 13-16, 18, 19, 33 and 34 are neither anticipated nor rendered obvious by U.S. Pat. No. 6,359,101 issued to O'Connor et al. Further, Claims 1-16, 18, 19, 33 and 34 are not rendered obvious by U.S. Pat. No. 6,077,978 issued to McDaniel et al. Finally, Claims 11 and 12 are

not rendered obvious by U.S. Pat. No. 6,359,101 issued to O'Connor et al. in view of U.S. Pat. No. 6,077,978 issued to McDaniel et al. Accordingly the rejections under 35 U.S.C. §§102(b) and 103(a), should be reversed, and favorable action by the Board is respectfully requested.

**A. The Rejections under 35 U.S.C. §§102(b)/103(a) over O'Connor et al. are Improper**

Claims 1-10, 13-16, 18, 19, 33 and 34 have been rejected under 35 U.S.C. §102(b), as being anticipated by, or in the alternative as rendered obvious, under 35 U.S.C. §103(a) by U.S. Pat. No. 6,359,101 issued to O'Connor et al. As will be set forth below, Appellant submits that Claims 1-10, 13-16, 18, 19, 33 and 34 are neither anticipated, nor rendered obvious, by the teachings of O'Connor et al. and the rejections thereof should be reversed.

**1. The Examiner's Rationale**

The Examiner has alleged at page 3, paragraph numbered 6 of the Final Office Action mailed June 14, 2007 that,

**Regarding Claims 1, 5-10, 13-16, 18, and 19**, O'Connor et al. disclose: **(1)** a process for the polyoxyalkylation of a starter (Abstract; column 1, lines 5-18), comprising:

(a) establishing oxyalkylation conditions in an oxyalkylation reactor in the presence of a DMC catalyst (Abstract; column 14, line 15 through column 15, line 62; Examples);

(b) continuously introducing into the reactor at least one alkylene oxide and a low molecular weight starter (Abstract; column 3, line 58 through column 6, line 2) acidified with at least one of an inorganic protic mineral acid, and an organic acid, wherein the acid comprises greater than 100 ppm, based on the weight of the starter (column 10, lines 57-64; Examples); **(5)** wherein the acid is chosen from *see claim for list* (column 10, lines 57-64; Examples); **(6)** wherein the acid is chosen from *see claim for list* (column 10, lines 57-64; Examples); **(7)** wherein the acid is phosphoric acid (column 10, lines 57-64; Examples); **(8)** wherein the acid comprises greater than 100 ppm to about 2,000 ppm, based on the weight of the starter (column 10, lines 57-64; Examples); **(9)** wherein the acid comprises about 200 ppm to about 300 ppm, based on the weight of the starter (column 10, lines 57-64; Examples); **(10)** wherein the reactor is a continuous reactor (column 14, line 15 through column 15, line 62); **(13)** wherein the continuous reactor comprises a back-mixed reactor (column 14, line 15 through column 15, line 62); **(14)** wherein the DMC catalyst is zinc hexacyanocobaltate (column 12, line 43 through column 13, line 30 - *see referenced*

documents in this passage); **(15)** wherein the alkylene oxide is *see claim for list* (Abstract; column 3, line 58 through column 6, line 2; Examples); **(16)** wherein the alkylene oxide is propylene oxide (Abstract; column 3, line 58 through column 6, line 2); **(18)** wherein the process is continuous (column 14, line 15 through column 15, line 62); and **(19)** wherein the process is semi-batch (column 14, line 15 through column 15, line 62).

O'Connor et al. disclose, "These polyols can range in molecular weight from 300 to 30,000," (see column 13, line 55 through column 14, line 14); however, they do not explicitly disclose the claimed molecular weight range of about 260 Da to about 2,500 Da.

Firstly, it has been found that when a claimed range, "overlap(s) or lie(s) inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists - *see MPEP 2144.05*. Secondly, it should be noted that the O'Connor et al. reference satisfies all of the process limitations set forth in the instant claims. In light of this, one of ordinary skill in the art would have expected to inherently produce the same or obvious results from the same or obvious process.

Therefore, the teachings of O'Connor et al. would have inherently or obviously satisfied the instant invention because they disclose the same process limitations set forth in the instant claims, wherein one of ordinary skill in the art would have expected to inherently produce the same or obvious results from the same or obvious process. Furthermore, they disclose a molecular weight range that overlaps the molecular weight range set forth in the instant claims.

Regarding Claims 2-4, the starter materials set forth in the claims are recognized as nonpreferred materials in O'Connor et al - *see column 10; lines 30-38; column 11, lines 44-55*. However, it has been found that, "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain," -*In re Heck*, 699 F.2d 133 1, 1332-33,216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d.1006, 1009,158 USPQ 275,277 (CCPA 1968)). *See: MPEP 2123*.

Therefore, the limitations of claims 2-4 are obviously or inherently satisfied because O'Connor et al. consider these starter materials as non-preferred embodiments.

Regarding Claims 33 and 34, the teachings of O'Connor et al. are as set forth above and incorporated herein to satisfy the limitations of claims 20-31, 33, and 34.

2. *The Claimed Processes are Patentably Distinguishable from the Cited Reference*

Appellant disputes the Examiner's assertions regarding O'Connor et al. and respectfully remind the Board that as stated in *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987), "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Further, "[t]he identical invention must be shown in as complete detail as is contained in the ...claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Appellant avers that the Examiner has failed to point to where O'Connor et al. do so.

Further, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. The teaching, suggestion, or motivation must be found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Kahn*, 441 F.3d 977, 78 USPQ2d 1329 (Fed. Cir. 2006); *In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); and *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Appellant begins by noting that all of the examples provided by O'Connor et al. apply to processes that are not commercially viable. O'Connor et al. use ratios of propylene oxide to starter in the range of >1 to about 10, whereas commercially viable processes use ratios in the range of about .05 to 0.2. Further, although O'Connor et al. allude to some special reactor at col. 15, lines 21-47 that may be useful for their process as a starter reactor, they do not describe this reactor in any way. As those skilled in the art are aware, the problem with such a high ratio, as is taught by O'Connor et al., is that once the system activates the propylene oxide generates about 7-8°C exotherm for each one percent oxide in the reactor. Thus, if a ratio of 0.1 (10%) is used, a potential temperature increase in the range of

70-80°C would be expected. If one were to use a ratio of 1.0 (50%) PO, the exotherm would be in the range of about 350°C to about 400°C above the starting temperature of the reactor.

As those skilled in the art are aware, at temperatures greater than about 320°C, the polyol being produced would start to exothermically decompose into smaller molecules creating pressure sufficient to rupture the reactor. O'Connor et al. themselves point out the issue of high temperature in their small reactor at the same time it was operating in an unsafe condition (see Table 6 and col. 13, lines 13-18, particularly the reference to the uncontrolled exotherm at col. 13, lines 17-18). In such a small reactor, the reactor mass to heat-evolved is sufficient to allow operation outside of the safety envelope of commercial systems. However, commercial systems are sufficiently large as to behave like adiabatic reactors and thus the potential for heat evolution must be more carefully controlled than is the case in O'Connor et al.

Thus, because they were operating in a nonviable region, it is difficult to draw any useful conclusions based on the data given in the O'Connor et al. patent. One can speculate about phosphoric acid neutralization as used by O'Connor et al. at the high oxide dilution levels as the Examiner does; however, there is no data that will allow one skilled in the art to extrapolate from the teachings of O'Connor et al. with any confidence.

Further, O'Connor et al. at col. 7, lines 15-20, assert that it is not possible to use glycerin with their invention, whereas the instantly claimed invention provides a useful process for the production of polyols using glycerin. O'Connor et al. disclose a procedure to allow the use of many starters with their dilution of the starter with very high levels of alkylene oxide. However, their method of using PO at very high levels is inherently unsafe and can only be practiced in very small reactors with high cooling capability and then only with significant safety risk. In contradistinction, the instantly claimed invention is directed to a procedure that will allow the use of glycerin and other starters having hydroxyl groups in close proximity to be used in a safer manner in a larger reactor, thus providing a commercially viable process.

Therefore, Claims 1-10, 13-16, 18, 19, 33 and 34 are neither anticipated, nor rendered obvious, by U.S. Pat. No. 6,359,101 issued to O'Connor et al and the rejections thereof under 35 U.S.C. §§102(b)/103(a) should be reversed.

**B. The Rejection under 35 U.S.C. §103(a) over McDaniel et al. is Improper**

Claims 1-16, 18, 19, 33 and 34 have been rejected under 35 U.S.C. §103 as being unpatentable over U.S. Pat. No. 6,077,978 issued to McDaniel et al. As will be set forth below, Appellant submits that Claims 1-16, 18, 19, 33 and 34 are not rendered obvious by the cited art and the rejection should be reversed.

**1. The Examiner's Rationale**

The Examiner has alleged at page 5, paragraph numbered 8 of the Final Office Action mailed June 14, 2007 that,

Regarding Claims 1-16, 18, and 19, McDaniel et al. disclose an almost identical process to claim **(1)** (Abstract; column 6, lines 48-58); wherein the starters of claims **(2-4)** are used (column 5, lines 25-39; column 7, lines 7-20); wherein the acids of claims **(5-7)** are used (column 6, lines 3-23); wherein the continuous reactor/conditions of claims **(10-13)** are used (column 7, lines 21-55); wherein the catalyst of claim **(14)** is used (Examples); wherein the alkylene oxide of claims **(15-16)** are used (Examples); wherein the approximate molecular weight range of claim **(1)** is produced (Examples); **(18)** wherein the process is continuous (column 7, lines 21- 55); and **(19)** wherein the process is semi-batch (column 7, lines 21-55).

The teachings of McDaniel are deficient in that they fail to explicitly disclose the use of: **(1)** greater than 100 ppm of acid; **(8)** greater than 100 ppm to about 2,000 ppm of acid; and **(9)** about 200 ppm to about 300 ppm of acid, all based on the weight of the starter. McDaniel discloses, "*In general*, less than 100 ppm acid based on total low molecular weight starter need to be added," (column 6, lines 55-58).

McDaniel et al. establish that this concentration is a result-effective variable, wherein a minimum is required to prevent de-activation of the DMC catalyst (column 5, lines 3-24). Their general teaching of less than 100 ppm is open to possible ranges above 100 ppm. Furthermore, applicant fails to show criticality for the lower end-points of the claimed ranges.

In light of this, it has been found that, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," -*In re*



*Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and, "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation," - *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the acid concentration in the process of McDaniel et al. because McDaniel et al. establish that this concentration is a result-effective variable, wherein a minimum is required to prevent de-activation of the DMC catalyst. Furthermore, applicant fails to demonstrate criticality for the claimed ranges.

Further with respect to the range of claim (1), the claimed range of greater than 100 ppm potentially abuts the disclosed range of less than 100 ppm. Even if these ranges do not touch or overlap, it has been found that a *prima facie* case of obviousness exists where, "the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties," - *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1 % iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.).

In addition, it should be noted that if these obvious amounts of acid were used in the process of McDaniel et al. one of ordinary skill in the art would have expected to yield the same molecular weight ranges set forth in claim (1) (*of about 260 Da to about 2,500 Da*). The use of these obvious amounts would yield the same or an obvious process of the one set forth in the claims. This same or obvious process would be expected to inherently produce the same or obvious results.

Regarding- Claims 33 and 34, the teachings of McDaniel et al. are as set forth above and incorporated herein to satisfy the limitations of claims 33 and 34.

2. *The Claimed Processes are Patentably Distinguishable from the Cited Reference*

Appellant disagrees with the Examiner's arguments reproduced above regarding McDaniel et al. and respectfully remind the Board of the Federal Circuit's admonition given against hindsight reconstruction in *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1458-9 (Fed. Cir. 1998) that, "...the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the PO-8155

cited prior art references for combination in the manner claimed.” Appellant respectfully contends that the Examiner has failed to do so in the instant case.

McDaniel et al. demonstrate that the addition of acid neutralizes alkaline residues and aids in the production of polyols based on glycerin and other starters. They nowhere state or suggest that the addition of acid beyond that required for neutralization (what the Examiner refers to above as “obvious amounts of acid”) provides any benefit. McDaniel et al. thus provide no teaching or guidance to one of ordinary skill in the art to even attempt such an addition.

Based upon the example of the instant application, the Appellant has discovered that it appears that there is a synergism between the DMC catalyst and the excess acid addition. The 60 ppm of acid added in the control is more than sufficient to neutralize the basic components in glycerin; however, the process fails in the production of a 700 MW polyol. The Appellant theorizes that the higher level of acid offsets the presence of water in the glycerin and/or offsets the problem, identified at col. 7 lines 15-20 of O’Connor et al., that is normally associated with starters having multiple hydroxyl groups in close proximity.

Thus, the cited reference fails to render obvious Claims 1-16, 18, 19, 33 and 34 and therefore the rejections thereof under 35 U.S.C. §103(a) should be reversed.

**C. The Rejection under 35 U.S.C. §103(a) over O’Connor et al. in view of McDaniel et al. is Improper**

Claims 11 and 12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 6,359,101 issued to O’Connor et al. in view of U.S. Pat. No. 6,077,978 issued to McDaniel et al. As will be set forth below, Appellants submit that Claims 11 and 12 are not rendered obvious by the cited combination of art and the rejections thereof should be reversed.

**1. The Examiner’s Rationale**

The Examiner has alleged at page 7, paragraph numbered 9 of the Final Office Action mailed June 14, 2007 that,

The teachings of both O’Connor et al. and McDaniel et al. are as set forth above and incorporated herein. The teachings of O’Connor et al. disclose a continuous reaction; however, they fail to explicitly disclose: **(11)** the use of a tubular reactor; and **(12)** the use of multi-point addition for introducing the reactants.

The analogous nature of these two references is readily established in light of the prior art rejections set forth above. In light of this, the teachings of McDaniel et al. establish that these limitations are recognized in the art as suitable reactors and feed techniques (*see column 7, lines 21-55*) for this type of continuous reaction.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a tubular reactor and multi-point addition, as taught by McDaniel et al., in the process of O'Connor et al. because the teachings of McDaniel et al. establish that these limitations are recognized in the art at suitable reactors and feed techniques for this type of continuous reaction.

***2. The Claimed Processes are Patentably Distinguishable from the Cited Combination of References***

Appellant's assertions with respect to the deficiencies of each of O'Connor et al. and McDaniel et al. have been given above in connection with rejections based upon the individual references and will not be repeated here in the interests of conserving the Board's time. O'Connor et al. fail to teach or suggest the instantly claimed invention. McDaniel et al. fail to teach or suggest the instantly claimed invention. The combination of references fails to remedy the shortcomings of each in such a manner as to lead one of ordinary skill in the art to the instantly claimed invention.

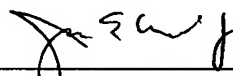
Thus, the cited combination of references fails to render obvious Claims 11 and 12 and therefore the rejections thereof under 35 U.S.C. §103(a) should be reversed.

**VIII. Conclusions**

Therefore, for the reasons set forth above, the rejections of Claims 1-16, 18, 19, 33 and 34 under 35 U.S.C. §§102(b) and 103(a) are erroneous and the Board's reversal of those rejections is respectfully requested.

Respectfully submitted

By



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## **XI. CLAIMS APPENDIX**

**Claim 1** A process for the polyoxyalkylation of a starter comprising:  
establishing oxyalkylation conditions in an oxyalkylation reactor in the presence of a  
double metal cyanide (DMC) catalyst;  
continuously introducing into the reactor at least one alkylene oxide and a low  
molecular weight starter acidified with at least one of an inorganic protic  
mineral acid and an organic acid, wherein the acid comprises greater than  
100 ppm, based on the weight of the starter; and  
recovering an oxyalkylated low molecular weight starter polyether product having a  
number average molecular weight of about 260 Daltons (Da) to about 2,500  
Da.

**Claim 2** The process according to Claim 1, wherein the starter is chosen from  
glycerine, diglycerol and polyglycerol.

**Claim 3** The process according to Claim 1, wherein the starter is glycerine.

**Claim 4** The process according to Claim 1, wherein the starter is chosen from  
ethylene glycol, propylene glycol, dipropylene glycol, trimethylol-propane,  
pentaerythritol, sorbitol and sucrose.

**Claim 5** The process according to Claim 1, wherein the acid is chosen from  
mineral acids, organic carboxylic acids, phosphonic acids, sulfonic acids and  
combinations thereof.

**Claim 6** The process according to Claim 1, wherein the acid is chosen from  
citric acid, 1,3,5-benzene tricarboxylic acids, phosphonic acids, p-toluenesulfonic  
acid, hydrochloric acid, hydrobromic acid, sulfuric acid, formic acid, oxalic acid, citric  
acid, acetic acid, maleic acid, maleic anhydride, succinic acid, succinic anhydride,

adipic acid, adipoyl chloride, adipic anhydride, thionyl chloride, phosphorous trichloride, carbonyl chloride, sulfur trioxide, thionyl chloride phosphorus pentoxide, phosphorous oxytrichloride and combinations thereof.

Claim 7        The process according to Claim 1, wherein the acid is phosphoric acid.

Claim 8        The process according to Claim 1, wherein the acid comprises greater than 100 ppm to about 2,000 ppm, based on the weight of the starter.

Claim 9        The process according to Claim 1, wherein the acid comprises about 200 ppm to about 300 ppm, based on the weight of the starter.

Claim 10       The process according to Claim 1, wherein the reactor is a continuous reactor.

Claim 11       The process according to Claim 10, wherein the continuous reactor comprises a tubular reactor.

Claim 12       The process according to Claim 10, wherein the step of continuously introducing the at least one alkylene oxide and the low molecular weight starter comprises multi-point addition.

Claim 13       The process according to Claim 10, wherein the continuous reactor comprises a back-mixed reactor.

Claim 14       The process according to Claim 1, wherein the DMC catalyst is a zinc hexacyanocobaltate.

Claim 15       The process according to Claim 1, wherein the alkylene oxide is chosen from ethylene oxide, propylene oxide, oxetane, 1,2- and 2,3-butylene oxide, isobutylene oxide, epichlorohydrin, cyclohexene oxide, styrene oxide and C<sub>5</sub>-C<sub>30</sub>  $\alpha$ -alkylene oxides.

Claim 16      The process according to Claim 1, wherein the alkylene oxide is propylene oxide.

Claim 18      The process according to Claim 1, wherein the process is continuous.

Claim 19      The process according to Claim 1, wherein the process is semibatch.

Claim 33      In a process of producing a polyurethane by the reaction of at least one isocyanate and at least one isocyanate reactive compound, the improvement comprising producing the isocyanate reactive compound by establishing oxyalkylation conditions in an oxyalkylation reactor in the presence of a double metal cyanide (DMC) catalyst, continuously introducing into the reactor at least one alkylene oxide and a low molecular weight starter acidified with at least one of an inorganic protic mineral acid and an organic acid, wherein the acid comprises in excess of 100 ppm, based on the weight of the low molecular weight starter and recovering an oxyalkylated low molecular weight starter polyether product having a number average molecular weight of about 260 Daltons (Da) to about 2,500 Da.

Claim 34      In a process of producing one of a coating, adhesive, sealant, elastomer and foam, the improvement comprising including the polyurethane according to Claim 33.

**X. EVIDENCE APPENDIX**

*In re Kahn*, 441 F.3d 977, 78 USPQ2d 1329 (Fed. Cir. 2006).

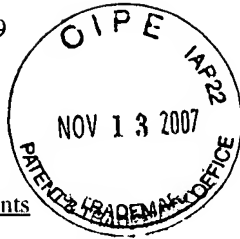
*In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).

*In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

*In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

*In re Rouffet*, 149 F.3d 1350, 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998).



**H**Briefs and Other Related Documents

United States Court of Appeals, Federal Circuit.

In re Leonard R. KAHN.

No. 04-1616.

March 22, 2006.

**Background:** Patent applicant appealed from the final decision of the Board of Patent Appeals and Interferences, concluding that claims in his patent application for a "reading machine" for blind readers were unpatentable as obvious.

**16Holding:** The Court of Appeals, Linn, Circuit Judge, held that substantial evidence supported Board's decision.

Affirmed.

## West Headnotes

**[1] Patents 291 ☞ 16.13**291 Patents291II Patentability291II(A) Invention; Obviousness291k16.13 k. Fact Questions. Most Cited Cases

Ultimate determination of whether an invention would have been obvious in light of prior art is a legal conclusion based on underlying findings of fact. 35 U.S.C.A. § 103(a).

**[2] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

Court of Appeals reviews the Board of Patent Appeals and Interferences' ultimate determination of obviousness de novo; however, Court of Appeals reviews the Board's underlying factual findings, including a finding of a motivation to combine, for substantial evidence. 35 U.S.C.A. §

103(a).**[3] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

"Substantial evidence" necessary to support determination of obviousness by the Board of Patent Appeals and Interferences is something less than the weight of the evidence but more than a mere scintilla of evidence; it means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. 35 U.S.C.A. § 103(a).

**[4] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

In reviewing the record of proceeding before the Board of Patent Appeals and Interferences, Court of Appeals must take into account evidence that both justifies and detracts from the factual determinations.

**[5] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

If a reasonable mind might accept the evidence as adequate to support the factual conclusions drawn by the Board of Patent Appeals and Interferences, then Court of Appeals must uphold the Board's determination.

**[6] Patents 291 ☞ 16(2)**291 Patents

291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(2) k. Prior Art in General. Most Cited Cases**Patents 291 ☞16(3)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(3) k. View of Person Skilled in Art. Most Cited Cases

In assessing whether subject matter of patent application would have been non-obvious, Board of Patent Appeals and Interferences determines scope and content of the prior art, ascertains differences between prior art and claims at issue, and resolves level of ordinary skill in the pertinent art; against this background, the Board determines whether the subject matter would have been obvious to a person of ordinary skill in the art at time of the asserted invention. 35 U.S.C.A. § 103(a).

**[7] Patents 291 ☞36.1(3)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.1 Secondary Factors Affecting Invention or Obviousness291k36.1(3) k. Longstanding Need and Solution to Problems. Most Cited Cases**Patents 291 ☞36.1(4)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.1 Secondary Factors Affecting Invention or Obviousness291k36.1(4) k. Failure of Others. Most Cited Cases**Patents 291 ☞36.2(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.2 Commercial Success291k36.2(1) k. In General. Most Cited Cases

In determining whether subject matter of patent application would have been obvious to a person of ordinary skill in the art at the time of the asserted invention, Board of Patent Appeals and Interferences can assess evidence related to secondary indicia of non-obviousness like commercial success, long felt but unresolved needs, and failure of others. 35 U.S.C.A. § 103(a).

**[8] Patents 291 ☞36(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36(1) k. In General. Most Cited Cases

Mere identification in the prior art of each element of claimed invention is insufficient to defeat the patentability of the combined subject matter as a whole; rather, to establish a prima facie case of obviousness based on a combination of elements disclosed in the prior art, Board of Patent Appeals and Interferences must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. 35 U.S.C.A. § 103(a).

**[9] Patents 291 ☞16(4)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(4) k. Critical Time; Hindsight. Most Cited Cases

When the Board of Patent Appeals and Interferences does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, Court of Appeals infers that the Board used hindsight to conclude that the invention was obvious. 35 U.S.C.A. § 103(a).

**[10] Patents 291 ☞16.5(1)**

291 Patents291II Patentability291II(A) Invention; Obviousness291k16.5 State of Prior Art and Advancement Therein291k16.5(1) k. In General. Most Cited Cases

“Analogous-art test” requires that the Board of Patent Appeals and Interferences show that a reference is either in the field of the applicant’s endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection as obvious; references are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. 35 U.S.C.A. § 103(a).

**[11] Patents 291 ↪ 16(4)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(4) k. Critical Time; Hindsight. Most Cited Cases

To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, Board of Patent Appeals and Interferences must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. 35 U.S.C.A. § 103(a).

**[12] Patents 291 ↪ 16.5(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16.5 State of Prior Art and Advancement Therein291k16.5(1) k. In General. Most Cited Cases

In determining whether an invention is obvious in light of prior art, suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references; test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and nature of the problem to be solved as a whole would have suggested to those of ordinary

skill in the art. 35 U.S.C.A. § 103(a).

**[13] Patents 291 ↪ 36(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36(1) k. In General. Most Cited Cases

Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. 35 U.S.C.A. § 103(a).

**[14] Patents 291 ↪ 16.5(4)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16.5 State of Prior Art and Advancement Therein291k16.5(4) k. Remedying Defects or Solving Problems. Most Cited Cases

In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted the inventor before the invention was made. 35 U.S.C.A. § 103(a).

**[15] Patents 291 ↪ 16(3)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(3) k. View of Person Skilled in Art. Most Cited Cases

“Motivation-suggestion-teaching” test used to determine whether invention is obvious in light of prior art asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with understandings and knowledge reflected in the prior art, and motivated by general problem facing the inventor, would have been led to make combination recited in the claims; from this it may be determined whether overall disclosures, teachings, and sug-

gestions of the prior art, and the level of skill in the art-i.e., the understandings and knowledge of persons having ordinary skill in the art at time of the invention-support legal conclusion of obviousness. 35 U.S.C.A. § 103(a).

#### [16] Patents 291 ⚡36(3)

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k36 Weight and Sufficiency

291k36(3) k. Particular Methods, Devices, or Products. Most Cited Cases

Substantial evidence supported determination of the Board of Patent Appeals and Interferences that claimed "reading machine" for blind readers that was operated by eye control and sound localization was obvious in light of prior art; each element of claimed invention could be found in prior art patents, and a person of ordinary skill in the art would have been motivated to apply the teachings of one of those patents, relating to benefit of acoustic imaging in reading systems, to achieve the claimed invention. 35 U.S.C.A. § 103(a).

#### [17] Patents 291 ⚡16(3)

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k16 Invention and Obviousness in General

291k16(3) k. View of Person Skilled in Art. Most Cited Cases

Prior art reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference or would be led in a direction divergent from the path that was taken by the applicant. 35 U.S.C.A. § 103(a).

#### [18] Patents 291 ⚡36.1(3)

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k36 Weight and Sufficiency

291k36.1 Secondary Factors Affecting Invention or Obvi-

ousness

291k36.1(3) k. Longstanding Need and Solution to Problems. Most Cited Cases

#### Patents 291 ⚡36.1(4)

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k36 Weight and Sufficiency

291k36.1 Secondary Factors Affecting Invention or Obviousness

291k36.1(4) k. Failure of Others. Most Cited Cases

Absent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness. 35 U.S.C.A. § 103(a).

#### Patents 291 ⚡328(2)

291 Patents

291XIII Decisions on the Validity, Construction, and Infringement of Particular Patents

291k328 Patents Enumerated

291k328(2) k. Original Utility. Most Cited Cases

4,322,744, 4,406,626, 4,579,533, 4,595,990. Cited as Prior Art.

\*979 Leonard R. Kahn, pro se, of New York, New York.

John M. Whealan, Solicitor, Office of the Solicitor, United States Patent and Trademark Office, of Arlington, Virginia, for the Director of the United States Patent and Trademark Office. With him on the brief \*980 were Linda Moncys Isacson and Raymond T. Chen, Associate Solicitors. Of counsel was Mary L. Kelly.

Before MICHEL, Chief Judge, LINN, and PROST, Circuit Judges.

LINN, Circuit Judge.

Leonard R. Kahn ("Kahn") appeals from the final decision of the Board of Patent Appeals and Interferences ("Board") concluding that claims 1-20 in patent application number 08/773,282 ("the '282 application") are unpatentable as obvious under 35 U.S.C. § 103.<sup>FN1</sup> Because the factual findings underlying the Board's conclusion are supported by substantial evidence, and because the Board did not commit



new page would be heard when the reader directed his or her attention to the upper left hand corner of the page where the first word on the new page would be expected.

'282 application at 11-13.

According to the specification, the device can employ a conventional scanner to input data; a conventional character recognition device to translate and send data to a storage device; and a page generator to take data from the storage device and format it for a visual display and for a word selector, the latter of which can send the data to a conventional speech synthesizer. After an optical sensor detects where a user is "looking" and a word is "selected" for vocalization, the synthesizer feeds an audio signal to a localizer control. \*982 Loud speakers are arranged at the corners of the "page" to allow the user to confirm localization of sound. The specification further indicates that [t]here are a number of devices available for sensing where an individual is looking. For example, Garwin et. al. 4,595,990 ..., Anderson et. al. 4,579,533 ... and Stanton 4,322,744 .... More specifically, Anderson's [sic] patent discusses feed-back which may be visual, auditory or tactile to verify decisions by eye control equipment.

However, such inventions are not suitable for totally blind individuals who are not verifying where they are looking but are using their eyes to direct which part of the artificial page should be read to produce a sound image. This makes essential a two dimensional stereo sound stage which the blind person solely depends upon.

'282 application at 16.

#### B. The Prior Art

The Board's rejection was based on Garwin et al., U.S. Patent No. 4,595,990 (issued June 17, 1986) ("Garwin"), in view of Anderson et al., U.S. Patent No. 4,406,626 (issued Sept. 27, 1983) ("Anderson '626"), Anderson et al., U.S. Patent No. 4,579,533 (issued April 1, 1986) ("Anderson '533"), and Stanton, U.S. Patent No. 4,322,744 (issued March 30, 1982) ("Stanton"). The Board alternatively used Anderson '626 or '533 as primary references.

Garwin discloses an eye-controlled interactive information

processor that senses the portion of a visual display at which the user is looking. The processor is connected to the display, which, in turn, can be partitioned so that different information is displayed in discrete areas. By gazing in different directions, the user informs the processor of the displayed item that is selected. Garwin, col. 2, ll. 60-68. The preferred embodiment employs a reflected light eye-tracking device to determine where the user is looking. *Id.* col. 3, l. 66-col. 4, l. 62. The eye-interactive control generally uses a technique where the user is presented with a number of targets having some meaning, such as "words or phrases" displayed on screen. *Id.* col. 9, ll. 62-67. "Visual, auditory or tactile" feedback is then given to the user to indicate that a selection has been received. *Id.* col. 2, ll. 10-11; col. 11, ll. 59-64. The user then can verify or cancel the selection. *Id.* col. 10, ll. 1-6. Garwin states that "it will be apparent to one skilled in the art that ... the benefits of the invention will be achieved by many types of apparatus." *Id.* col. 2, ll. 50-53. It can be used for "request[ing] display of a page of text from a ... table of contents," *id.* col. 3, ll. 42-44, or "[other] presentation of textual material," *id.* col. 10, ll. 31-33.

Anderson '626 discloses an interactive "electronic teaching aid" which enables a user viewing text on a display to designate any words or portion of text for immediate audible vocalization. Anderson '626, col. 1, l. 8; col. 2, ll. 11-17. The components include: a selector switch, which when in the "text" position, causes data to be transmitted to a monitor and displayed in legible form, *id.* col. 3, ll. 27-31; an advance button, which when depressed allows the user to select and retrieve the next page of text from memory, *id.* col. 3, ll. 31-41; a memory, which can store each word of the text coded for speech, *id.* col. 3, l. 66-col. 4, l. 6; and a word designator light pen, which the user can place on a word to hear the word vocalized through the speaker, *id.* col. 3, ll. 54-68; col. 10, ll. 51-58. Anderson '533 discloses an improved microprocessor-based version of Anderson '626. Anderson '533, col. 1, ll. 19-24, 41-56.

\*983 Stanton discloses an acoustical imaging system for use by visually impaired individuals that uses horizontal and vertical directional sound to represent visual aspects of an environment. Stanton states that a user can locate "the posi-

tion of a virtual sound source as representing a point in space” such that different signals may represent different directions. Stanton, col. 1, ll. 58-61. The preferred embodiment features four loud speakers or transducers mounted at the corners of a vertical display panel. *Id.*, col. 2, ll. 54-55. When the user moves the cursor, the sound emanating from the speakers is phase shifted to produce a virtual sound seeming to come from a particular location related to the position of the cursor. *Id.*, col. 1, l. 66-col. 2, l. 2; col. 2, ll. 55-63. In another embodiment, a quadraphonic headset is used in place of the transducers to achieve the effect of producing a virtual sound identifying a position. *Id.*, col. 4, ll. 26-35. Stanton states that the device may be used as a “rudimentary reading device.” *Id.*, col. 1, ll. 62.

### C. The Board Decisions

**Kahn** filed the '282 application with 22 claims as a continuation-in-part of application number 07/645,102 (“the '102 application”), which was filed in 1991. The '102 application was a continuation-in-part of a series of abandoned continuing applications dating back to application number 07/338,597, which was filed in 1989. While claims 21 and 22 of the '282 application are not at issue in this appeal, the Board addressed those claims on several occasions, which led to the creation of a substantial Board history. As a result, the final decision with respect to the obviousness rejection of claims 1-20 spans three decisions, which include *Ex Parte Kahn*, No.2004-1091 (B.P.A.I. June 30, 2004) (“2004 decision”); *Ex Parte Kahn*, No.2000-1130 (B.P.A.I. Feb. 24, 2003) (“2003 decision”); and *Ex Parte Kahn*, No. 94-2233 (B.P.A.I. Sept. 21, 1995) (“1995 decision”).

In its 1995 decision, after reversing the examiner's anticipation rejection, the Board *sua sponte* rejected the relevant claims under § 103. The Board found that Garwin taught “the concepts of determining where on a display screen a user is ‘looking’ ... and giving either visual or auditory feedback to the user” and that “[w]hile nothing specific is said as to acoustically reproducing a word displayed at that location, common sense ... indicate[s] that such an auditory feedback response is appropriate in view of such auditory feedback confirmation clearly suggested by Anderson '533 or '626.” 1995 decision, slip op. at 5 (emphasis in original). The Board found that “to whatever extent Garwin is not

concerned with text *per se*, [the Anderson] references are” and “teach the advantages of text display with audio reproduction,” concluding that the artisan would have found it to have been obvious to have modified Garwin for display of text passages and selection of works therefrom with vocalization thereof as feedback confirmation, all as taught by Anderson '626 or '533 ... [or] to have modified either of these Anderson references to use the eye control of Garwin so that the user's hands would have been free for other tasks.

*Id.*, slip op. at 5-6. The Board found that Stanton “teaches the benefit of acoustic imaging in reading systems” and that “[i]t would have, thus, been further obvious to the artisan to add advantageous acoustic imaging to either of the above-noted modified devices of Garwin or the Anderson patents which would have word positions acoustically and visually indicated.” *Id.*, slip op. at 6.

In its 2003 decision, the Board expressly incorporated the findings and rationale \*984 from both its 1995 decision and the Examiner's Answer filed on April 24, 2000. 2003 decision, slip op. at 3-4. In the Answer, the Examiner had explained that Garwin teaches “a buffer memory which stores at least a portion of the information derived from sensing means and means for subsequently retrieving the sensed information,” “means for displaying stored written text,” and “means for determining which word of the displayed text the user is looking towards”; that Anderson '626 teaches “means for generating speech sounds verbalizing the looked at word”; and that Stanton teaches “means for verbalizing each word the user's eyes are directed towards in two dimensional stereo.” Examiner's Answer at 5-6. Rejecting **Kahn's** argument that hindsight drove the combination of references, the Board reiterated that the rationale of the 1995 decision was correct and explained that motivation “clearly is based upon a prospective look at the state of the art.” 2003 decision, slip op. at 8-11.

The Board addressed several other arguments. First, the Board rejected the argument that the invention's intended use supports patentability, noting that “the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus [from] a prior art apparatus satisfying the claimed structural limitations.” *Id.* at 5-6.

Second, the Board rejected the argument that because “the purposes of the [prior art] references ... are different from the [invention's] purpose,” the invention is non-obvious, explaining that “[t]he law ... does not require that references be combined for reasons contemplated by an inventor” and that “prior art need not suggest the same problem set forth by appellant.” *Id.* at 6-7. Third, the Board rejected the arguments that features of a secondary reference be capable of incorporation into the structure of a primary reference and that the invention be suggested completely by one reference. *Id.* at 7. Finally, the Board rejected a “long-felt need” argument, explaining that Khan had not presented any objective evidence of a long-standing problem or long-standing need in the art. *Id.* at 11-12.

In its 2004 decision, the Board entered a final rejection of claims 1-20 based on its 2003 decision. **Kahn** timely appealed to this court. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

## II. DISCUSSION

### A. The Parties' Arguments

Khan advances two main arguments. First, Khan asserts that the Board's finding of motivation to combine was unsupported by substantial evidence. Citing *In re Lee*, 277 F.3d 1338 (Fed.Cir.2002), and *In re Rouffet*, 149 F.3d 1350 (Fed.Cir.1998), Khan argues that the Board overstated the knowledge of the skilled artisan and employed improper hindsight. Specifically, Khan asserts that a skilled artisan would not have sought to augment Garwin with sound because the resulting device would be more expensive and less reliable for the purpose intended by Garwin. He contends that just because Stanton teaches use of sound to confirm a visual perception of a shape like a letter-which provides a “rudimentary” reading capability-does not mean that the reference teaches how to enable a blind user to “read” and “reread” entire words and phrases quickly. Khan further contends that Stanton teaches away from a system that employs iris eye direction sensing because Stanton requires the user to hold his head steady, because eyes are not involved in its localization procedure, and because the combined device would be expensive and inoperable. Second, Khan argues that the court should take “judicial notice” that his

\*985 reading machine addresses a “long-felt, but unresolved need,” and that this consideration is sufficient to rebut a *prima facie* case of obviousness.

The Patent and Trademark Office (“PTO”) counters that *Lee* and *Rouffet* are distinguishable because here the Board identified motivations to combine the references based on specific statements in the references and on the nature of the problem to be solved. As to long-felt need, the PTO argues that **Kahn** proffered no actual evidence, and that **Kahn's** argument alone is insufficient to rebut a *prima facie* case.

### B. Standard of Review

[1][2] A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the pertinent art. 35 U.S.C. § 103(a) (2000); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966). The ultimate determination of whether an invention would have been obvious is a legal conclusion based on underlying findings of fact. *In re Dembiczak*, 175 F.3d 994, 998 (Fed.Cir.1999). We review the Board's ultimate determination of obviousness *de novo*. *Id.* However, we review the Board's underlying factual findings, including a finding of a motivation to combine, for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316 (Fed.Cir.2000).

[3][4][5] Substantial evidence is something less than the weight of the evidence but more than a mere scintilla of evidence. *Id.* at 1312 (citing *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229-30, 59 S.Ct. 206, 83 L.Ed. 126 (1938)). It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. *Consol. Edison*, 305 U.S. at 229-30, 59 S.Ct. 206. In reviewing the record, we must take into account evidence that both justifies and detracts from the factual determinations. *Gartside*, 203 F.3d at 1312 (citing *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 487-88, 71 S.Ct. 456, 95 L.Ed. 456 (1951)). We note that the possibility of drawing two inconsistent conclusions from the evidence does not prevent the Board's findings from being supported by substantial evidence. *Id.* Indeed, if a reasonable mind might accept the evidence as adequate to support the factual conclusions drawn by the Board, then we



must uphold the Board's determination. *Id.*

### C. Analysis

[6][7] In assessing whether subject matter would have been non-obvious under § 103, the Board follows the guidance of the Supreme Court in *Graham v. John Deere Co.* The Board determines “the scope and content of the prior art,” “ascertains ‘the differences between the prior art and the claims at issue,’ ” and resolves “the level of ordinary skill in the pertinent art.” *Dann v. Johnston*, 425 U.S. 219, 226, 96 S.Ct. 1393, 47 L.Ed.2d 692 (1976) (quoting *Graham*, 383 U.S. at 17, 86 S.Ct. 684). Against this background, the Board determines whether the subject matter would have been obvious to a person of ordinary skill in the art at the time of the asserted invention. *Graham*, 383 U.S. at 17, 86 S.Ct. 684. In making this determination, the Board can assess evidence related to secondary indicia of non-obviousness like “commercial success, long felt but unresolved needs, failure of others, etc.” *Id.*, 383 U.S. at 17-18, 86 S.Ct. 684; accord *Rouffet*, 149 F.3d at 1355. We have explained that

[t]o reject claims in an application under section 103, an examiner must show an unrebutted *prima facie* case of obviousness .... On appeal to the Board, an applicant can overcome a rejection by \*986 showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.

*Rouffet*, 149 F.3d at 1355.

[8] Most inventions arise from a combination of old elements and each element may often be found in the prior art. *Id.* at 1357. However, mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole. *Id.* at 1355, 1357. Rather, to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. *Id.* In practice, this requires that the Board “explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.” *Id.* at 1357-59. This entails consideration of both the “scope and content of the prior

art” and “level of ordinary skill in the pertinent art” aspects of the *Graham* test.

[9] When the Board does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, we infer that the Board used hindsight to conclude that the invention was obvious. *Id.* at 1358. The “motivation-suggestion-teaching” requirement protects against the entry of hindsight into the obviousness analysis, a problem which § 103 was meant to confront. See 35 U.S.C. § 103 (stating that obviousness must be assessed “at the time the invention was made”); *Dembiczuk*, 175 F.3d at 998 (“[I]t is this phrase that guards against entry into the tempting but forbidden zone of hindsight.” (internal quotations omitted)); Giles S. Rich, *Laying the Ghost of the Invention Requirement*, 1 APLA Q.J. 26-45 (1972), reprinted in 14 Fed. Cir. B.J. 163, 170 (2004) (“To protect the inventor from hindsight reasoning, the time is specified to be *the time when the invention was made.*”) (emphasis in original). The Supreme Court recognized the hindsight problem in *Graham* and proposed that “legal inferences” resulting from “secondary considerations” might help to overcome it. 383 U.S. at 36, 86 S.Ct. 684 (“[Secondary considerations] may also serve to guard against slipping into use of hindsight, and to resist the temptation to read into the prior art the teachings of the invention in issue.” (internal quotations omitted)). By requiring the Board to explain the motivation, suggestion, or teaching as part of its *prima facie* case, the law guards against hindsight in all cases—whether or not the applicant offers evidence on secondary considerations—which advances Congress’s goal of creating a more practical, uniform, and definite test for patentability. See *Dann*, 425 U.S. at 225-26, 96 S.Ct. 1393 (“[I]t was only in 1952 that Congress, in the interest of ‘uniformity and definiteness,’ articulated the requirement in a statute.” (quoting S.Rep. No.1979, at 6 (1952); H.R.Rep. No.1923, at 7 (1952))); *Graham*, 383 U.S. at 17, 86 S.Ct. 684 (“The § 103 [test], when followed realistically, will permit a more practical test of patentability.”).

[10] Although our predecessor court was the first to articulate the motivation-suggestion-teaching test, a related test—the “analogous art” test—has long been part of the primary

*Graham* analysis articulated by the Supreme Court. See *Dann*, 425 U.S. at 227-29, 96 S.Ct. 1393; *Graham*, 383 U.S. at 35, 86 S.Ct. 684.<sup>FN2</sup> The \*987 analogous-art test requires that the Board show that a reference is either in the field of the applicant's endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. *In re Oetiker*, 977 F.2d 1443, 1447 (Fed.Cir.1992). References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* ("[I]t is necessary to consider 'the reality of the circumstances,' in other words, common sense in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor." (quoting *In re Wood*, 599 F.2d 1032, 1036 (C.C.P.A.1979))). We have explained that this test begins the inquiry into whether a skilled artisan would have been motivated to combine references by defining the prior art relevant for the obviousness determination, and that it is meant to defend against hindsight. See *id.*; *In re Clay*, 966 F.2d 656, 659-60 (Fed.Cir.1992).<sup>FN3</sup>

<sup>FN2</sup> In *Graham*, Cook Chemical challenged the court's reliance on a reference that it believed was not in a "pertinent prior art," arguing that while the invention involved a container having a "pump sprayer," the reference related to containers having "pouring spouts." 383 U.S. at 35, 86 S.Ct. 684. In reaching the conclusion that the claimed subject matter was obvious, the Court rejected Cook's argument, explaining that the problem to be solved was a mechanical closure problem and that a closure device in such a closely related art was a pertinent reference. *Id.* Similarly, in *Dann*, the invention involved the use of automatic data processing equipment to analyze transactions within a single bank account. 425 U.S. at 227-28, 96 S.Ct. 1393. The Dirk reference that the Court relied upon in making its obviousness case involved a similar system used in a non-banking context. *Id.* at 228, 96 S.Ct. 1393. Citing *Graham*, the Court explained that a person of ordinary skill in the art would be aware of this reference and the Court could rely upon it in making its obviousness case because

"[w]hile the Dirk's invention is not designed specifically for application to the banking industry many of its characteristics and capabilities are similar to those of respondent's system." *Id.* at 229, 96 S.Ct. 1393.

<sup>FN3</sup> In *In re Clay*, we reasoned that [i]f a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it. 966 F.2d at 659-60. In *In re Oetiker*, we held that "the combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a *prima facie* case of obviousness." 977 F.2d at 1447.

[11] The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law, see § 103(a); *Graham*, 383 U.S. at 35, 86 S.Ct. 684; *Dann*, 425 U.S. at 227-29, 96 S.Ct. 1393, and helps ensure predictable patentability determinations.

[12][13] A suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references.... The test for an implicit\*988 showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a

whole would have suggested to those of ordinary skill in the art.

*In re Kotzab*, 217 F.3d 1365, 1370 (Fed.Cir.2000) (internal citations omitted). However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. See *Lee*, 277 F.3d at 1343-46; *Rouffet*, 149 F.3d at 1355-59. This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103. See *id.* at 1344-45.

[14][15] In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted the inventor before the invention was made. See, e.g., *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1323 (Fed.Cir.2005) (“One of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings.”); *Ecologchem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1372 (Fed.Cir.2000) (“Although the suggestion to combine references may flow from the nature of the problem, ‘[d]efining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness.’ ” (internal citation omitted) (quoting *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed.Cir.1998))); *In re Beattie*, 974 F.2d 1309, 1312 (Fed.Cir.1992) (“[T]he law does not require that the references be combined for the reasons contemplated by the inventor.”); *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed.Cir.2005) (characterizing the relevant inquiry as “[would] an artisan of ordinary skill in the art at the time of the invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, [ ] have selected the various elements from the prior art and combined them in the manner claimed”); see also *Graham*, 383 U.S. at 35, 86 S.Ct. 684 (characterizing the problem as involving mechanical closures rather than in terms more specific to the patent in the context of determining the pertinent prior art). Therefore, the “motivation-suggestion-teaching” test asks not

merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. See *Cross Med. Prods.*, 424 F.3d at 1321-24. From this it may be determined whether the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art—i.e., the understandings and knowledge of persons having ordinary skill in the art at the time of the invention—support the legal conclusion of obviousness. See *Princeton Biochemicals*, 411 F.3d at 1338 (pointing to evidence supplying detailed analysis of the prior art and the reasons one of ordinary skill would have possessed the knowledge and motivation to combine).

[16] In this case, Khan does not dispute that each element of his claimed invention can be found in either Garwin, Anderson '533 and '626, or Stanton, or that each reference lies in the pertinent art. Nor does Khan take issue with the Board's finding that a person having ordinary skill in the art would have been motivated to modify Anderson '533 or '626 in view of \*989 Garwin, or vice versa. See Garwin, col. 2, ll. 50-53, col. 10, ll. 31-35 (stating that “it will be apparent to one skilled in the art that ... the benefits of the invention will be achieved by many types of apparatus” which may be “virtually [any device] susceptible of control by a computer, including ... [those geared] to presentation of textual material”).

Rather, Khan's challenge to the sufficiency of the evidence supporting the Board's *prima facie* case is directed at the motivation to apply the teachings of Stanton to achieve the claimed invention. In the 1995 decision, the Board found that Stanton “teaches the benefit of acoustic imaging in reading systems.” The Board carefully examined the Anderson/Garwin combination and recognized that a skilled artisan confronted with the problem faced by Kahn would have been led by the teaching of Stanton “to add advantageous acoustic imaging” to the Anderson/Garwin combination so that it would have “word positions acoustically and visually indicated.”

Stanton teaches that “[its] invention relates to augmentation of vision of those who have lost vision or have had their

visual faculties diminished,” col. 1, ll. 6-8, that it is “useful in teaching a deprivee to apprehend the position of a virtual sound source as representing a point in space,” *id.*, ll. 58-59, and that it may be used as a “rudimentary reading device,” *id.*, ll. 61-62. A skilled artisan, who knows of a “learning machine” that is capable of reading a word aloud by selecting the word on the screen at which the user is looking and seeks to provide a visually-impaired user better control over word localization,<sup>FN4</sup> would have reason to solve that problem by adding two-dimensional sound in view of Stanton’s express teaching that two-dimensional sound can be used to “substitute” for the lost sense of sight, to locate a point in space, and to create a “rudimentary reading device” for the visually impaired. See Cross Med. Prods., 424 F.3d at 1323 (holding that “[o]ne of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings”). Because the Board need only establish motivation to combine by a preponderance of the evidence to make its *prima facie* case, see In re Glaug, 283 F.3d 1335, 1338 (Fed.Cir.2002), we conclude that substantial evidence supports the finding of a motivation to combine the teachings of Stanton to the Anderson/Garwin combination. Although a reasonable person might reach the opposite conclusion, there is far more than a “mere scintilla” of evidence present from which a reasonable mind could find a motivation to combine.

**FN4.** Kahn does not argue that one of ordinary skill in the art at the time of the invention would be unaware of the nature of this problem, and there is nothing in the record to suggest this to be the case, unlike the facts in the decision of our predecessor court in In re Spinnoble, 56 C.C.P.A. 823, 405 F.2d 578 (1969).

We reject Khan’s argument that the Board overstated the knowledge of the person having ordinary skill in the art or employed improper hindsight in making its *prima facie* case. In both *Lee* and *Rouffet*, the Board recognized that the knowledge of the skilled artisan could provide the motivation to combine but concluded that no such knowledge was articulated and placed on the record. Lee, 277 F.3d at 1343-45; Rouffet, 149 F.3d at 1357-59. In this case, motivation to combine was articulated and placed on the record. As

to the Anderson/Garwin combination, the Board identified the desire to free up the hands of the Anderson user as the problem confronted and found that Garwin itself evidenced the broad applicability of its optical \*990 controls to the claimed invention. As to the addition of Stanton, the Board identified express teachings in Stanton of “the benefit of acoustic imaging in reading systems” and properly related those teachings to the Anderson/Garwin combination.

[17] We find Khan’s remaining arguments unpersuasive. First, even if applying Stanton to Garwin resulted in a device that would be less effective for the purpose intended by Garwin, the teaching of the Garwin reference is not limited to the specific invention disclosed. See In re Heck, 699 F.2d 1331, 1333 (Fed.Cir.1983) (explaining that “[t]he use of patents as references is not limited to what the patentees describe as their own inventions” (internal quotations omitted)). As noted above, Garwin states that his invention is intended to be applied to “virtually [any device] susceptible of control by a computer, including ... [those geared] to presentation of textual material,” Garwin, col. 2, ll. 50-53; col. 10, ll. 31-35. Second, although Khan may have envisioned something different than the skilled artisan when he looked at Stanton because Stanton teaches only a *rudimentary* reading device, the skilled artisan need not be motivated to combine Stanton for the same reason contemplated by Khan. See In re Beattie, 974 F.2d 1309, 1312 (Fed.Cir.1992) (“As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor.” (citing In re Kronig, 539 F.2d 1300, 1304 (C.C.P.A.1976))). Third, Khan’s argument that Stanton itself teaches away from the combination with Garwin lacks support in the reference. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” In re Gurley, 27 F.3d 551, 553 (Fed.Cir.1994). Nothing in Stanton can be said to discourage a person having ordinary skill in the art from using the visual-input control taught in Garwin in the claimed combination or to lead the skilled artisan in a direction divergent from the path taken by Kahn.

[18] Finally, we note that **Kahn** had an opportunity to rebut the Board's *prima facie* case by offering evidence of objective indicia of non-obviousness. Khan put on no evidence, but invites this court to take "judicial notice" of the long-felt but unresolved need for a device that will help the blind read. We must decline Khan's invitation for the following reasons. First, "long-felt but unresolved need" is not the kind of undisputed fact to which courts are accustomed to taking "judicial notice" because a finding either way can "reasonably be questioned." See Fed.R.Evid. 201(b) ("A judicially noticed fact must be one not subject to reasonable dispute in that it is either (1) generally known within the territorial jurisdiction of the trial court or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned."); In re Fielder, 471 F.2d 640, 642-43 (C.C.P.A.1973) (declining to take judicial notice of prior art references that appellant submitted as objective evidence of non-obviousness because appellant did not offer references to the Board and they were not part of the record). Second, our precedent requires that the applicant submit actual evidence of long-felt need, as opposed to argument. This is because "[a]bsent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness." \*991Iron Grip Barbell Co. v. USA Sports, Inc., 392 F.3d 1317, 1325 (Fed.Cir.2004); accord In re Wright, 569 F.2d 1124, 1127 (C.C.P.A.1977).

### III. CONCLUSION

Because the factual findings underlying the Board's analysis, including the findings on motivation to combine, are supported by substantial evidence, we conclude that the Board did not err in rejecting claims 1-20 as *prima facie* obvious. Because Khan did not rebut the Board's *prima facie* case, the Board's decision is

**AFFIRMED.**

C.A.Fed.,2006.

In re Kahn

441 F.3d 977, 78 U.S.P.Q.2d 1329

Briefs and Other Related Documents ([Back to top](#))

- [2005 WL 3957166](#) (Appellate Brief) Reply to Uspto's Appellee Brief (Dec. 13, 2005) Original Image of this Document with Appendix (PDF)
- [2005 WL 3569317](#) (Appellate Brief) Brief for Appellee Director of the United States Patent and Trademark Office (Oct. 26, 2005) Original Image of this Document with Appendix (PDF)
- [04-1616](#) (Docket) (Aug. 19, 2004)

END OF DOCUMENT



In re Sang Su Lee  
C.A.Fed.,2002.

United States Court of Appeals,Federal Circuit.

In re SANG-SU LEE.

No. 00-1158.

Jan. 18, 2002.

Board of Patent Appeals and Interferences rejected all claims of inventor's patent application directed toward method of automatically displaying functions of video display device that demonstrated how to select and adjust functions in order to facilitate response by user. Inventor appealed. The Court of Appeals, Pauline Newman, Circuit Judge, held that analysis by Board did not comport with either legal requirements for determination of obviousness or with requirements of Administrative Procedure Act (APA).

Vacated and remanded.

West Headnotes

[1] Patents 291 ⚙️113(6)

291 Patents

291IV Applications and Proceedings Thereon

291k113 Appeals from Decisions of Commissioner of Patents

291k113(6) k. Review on Appeal in General. Most Cited Cases

Tribunals of the Patent and Trademark Office (PTO) are governed by the Administrative Procedure Act (APA), and their rulings receive the same judicial deference as do tribunals of other administrative agencies. 5 U.S.C.A. § 551 et seq.

[2] Administrative Law and Procedure 15A ⚙️485

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak484 Findings

15Ak485 k. Necessity and Purpose.

Most Cited Cases

Administrative Law and Procedure 15A ⚙️507

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak507 k. Report or Opinion; Reasons for Decision. Most Cited Cases

For judicial review to be meaningfully achieved within the strictures of the Administrative Procedures Act (APA), an agency tribunal must present a full and reasoned explanation of its decision; the agency tribunal must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts. 5 U.S.C.A. § 706(2).

[3] Patents 291 ⚙️113(6)

291 Patents

291IV Applications and Proceedings Thereon

291k113 Appeals from Decisions of Commissioner of Patents

291k113(6) k. Review on Appeal in General. Most Cited Cases

Judicial review of a decision of the Board of Patent Appeals and Interferences denying an application for a patent is founded on the obligation of the agency to make the necessary findings and to provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions. 5 U.S.C.A. § 551 et seq.

[4] Patents 291 ⚙️31.1

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k31 Evidence of Invention

291k31.1 k. In General. Most Cited Cases

As applied to the determination of patentability vel

non when the issue is obviousness, it is fundamental that the rejection of a patent application must be based on evidence comprehended by the language of the statute addressing obviousness. 35 U.S.C.A. § 103.

**[5] Patents 291 ➡ 16.5(1)**

291 Patents

291III Patentability

291III(A) Invention; Obviousness

291k16.5 State of Prior Art and Advancement Therein

291k16.5(1) k. In General. Most Cited

Cases

The patent examination process centers on prior art and the analysis thereof; when patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. 35 U.S.C.A. § 103.

**[6] Patents 291 ➡ 26(1)**

291 Patents

291III Patentability

291III(A) Invention; Obviousness

291k26 Combination

291k26(1) k. In General. Most Cited

Cases

In the context of an obviousness determination by the Board of Patent Appeals and Interferences, the factual inquiry whether to combine references must be thorough and searching; it must be based on objective evidence of record. 35 U.S.C.A. § 103.

**[7] Patents 291 ➡ 111**

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Analysis of invention by Board of Patent Appeals and Interferences did not comport with either legal requirements for determination of obviousness or with requirements of Administrative Procedure Act

(APA) on basis that agency tribunal did not set forth findings and explanations needed for reasoned decisionmaking; examiner used conclusory statements to support his subjective belief that it was obvious that person skilled in the art would have been motivated to combine prior art, and Board rejected need for any specific hint or suggestion in particular reference to support combination of prior art. 5 U.S.C.A. § 706(2); 35 U.S.C.A. § 103.

**[8] Patents 291 ➡ 26(1)**

291 Patents

291III Patentability

291III(A) Invention; Obviousness

291k26 Combination

291k26(1) k. In General. Most Cited

Cases

In an obviousness determination, the factual question of motivation to combine prior art is material to patentability, and cannot be resolved on subjective belief and unknown authority. 35 U.S.C.A. § 103.

**[9] Patents 291 ➡ 26(1)**

291 Patents

291III Patentability

291III(A) Invention; Obviousness

291k26 Combination

291k26(1) k. In General. Most Cited

Cases

**Patents 291 ➡ 111**

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

In an obviousness determination under patent law, it is improper, in determining whether a person of ordinary skill would have been led to combine references, simply to use that which the inventor taught against its teacher; thus, the Board of Patent Appeals and Interferences must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the

agency's conclusion. 5 U.S.C.A. § 706(2); 35 U.S.C.A. § 103.

**[10] Administrative Law and Procedure 15A**  
**↪507**

**15A Administrative Law and Procedure**

**15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents**

**15AIV(D) Hearings and Adjudications**

**15Ak507** k. Report or Opinion; Reasons for Decision. Most Cited Cases  
Deferential judicial review under the Administrative Procedure Act (APA) does not relieve the agency of its obligation to develop an evidentiary basis for its findings; to the contrary, the APA reinforces this obligation. 5 U.S.C.A. § 706(2).

**[11] Administrative Law and Procedure 15A**  
**↪763**

**15A Administrative Law and Procedure**

**15AV Judicial Review of Administrative Decisions**

**15AV(D) Scope of Review in General**

**15Ak763** k. Arbitrary, Unreasonable or Capricious Action; Illegality. Most Cited Cases

**Administrative Law and Procedure 15A ↪796**

**15A Administrative Law and Procedure**

**15AV Judicial Review of Administrative Decisions**

**15AV(E) Particular Questions, Review of**

**15Ak796** k. Law Questions in General. Most Cited Cases

In the context of judicial review under the Administrative Procedure Act (APA), a decision by an agency tribunal that has an omission of a relevant factor required by precedent is both legal error and "arbitrary agency action." 5 U.S.C.A. § 551 et seq.

**[12] Administrative Law and Procedure 15A**  
**↪485**

**15A Administrative Law and Procedure**

**15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents**

**15AIV(D) Hearings and Adjudications**

**15Ak484** Findings

**15Ak485** k. Necessity and Purpose.

Most Cited Cases

**Administrative Law and Procedure 15A ↪760**

**15A Administrative Law and Procedure**

**15AV Judicial Review of Administrative Decisions**

**15AV(D) Scope of Review in General**

**15Ak754** Discretion of Administrative Agency

**15Ak760** k. Wisdom, Judgment or Opinion. Most Cited Cases

The foundation of the principle of judicial deference under the Administrative Procedures Act (APA) to the rulings of agency tribunals is that the tribunal has specialized knowledge and expertise, such that when reasoned findings are made, a reviewing court may confidently defer to the agency's application of its knowledge in its area of expertise; however, reasoned findings are critical to the performance of agency functions and judicial reliance on agency competence. 5 U.S.C.A. § 706(2).

**[13] Patents 291 ↪16(1)**

**291 Patents**

**291II Patentability**

**291II(A) Invention; Obviousness**

**291k16** Invention and Obviousness in General

**291k16(1)** k. In General. Most Cited Cases

The determination of patentability on the ground of unobviousness is ultimately one of judgment; in furtherance of the judgmental process, the patent examination procedure serves both to find, and to place on the official record, that which has been considered with respect to patentability. 35 U.S.C.A. § 103.

**[14] Patents 291 ↪16(3)**

**291 Patents**

**291II Patentability**

**291II(A) Invention; Obviousness**



291k16 Invention and Obviousness in  
General

291k16(3) k. View of Person Skilled in  
Art. Most Cited Cases

**Patents 291 ↪104**

291 Patents

291IV Applications and Proceedings Thereon

291k104 k. Examination and Proceedings on  
Application in General. Most Cited Cases

**Patents 291 ↪111**

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most  
Cited Cases

In the context of an obviousness determination, the patent examiner and the Board of Patent Appeals and Interferences are deemed to have experience in the field of the invention; however, this experience, insofar as applied to the determination of patentability, must be applied from the viewpoint of the person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C.A. § 103.

**[15] Patents 291 ↪104**

291 Patents

291IV Applications and Proceedings Thereon

291k104 k. Examination and Proceedings on  
Application in General. Most Cited Cases

In finding the relevant facts, in assessing the significance of the prior art, and in making the ultimate determination of the issue of obviousness, the examiner and the Board of Patent Appeals and Interferences are presumed to act from the viewpoint of a person having ordinary skill in the art to which the subject matter pertains; thus, when they rely on what they assert to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record and the failure to do so is not consistent with either effective administrative procedure or effective judicial review. 5 U.S.C.A. § 706(2); 35 U.S.C.A. § 103.

**[16] Patents 291 ↪111**

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most  
Cited Cases

In the context of an obviousness determination, the Board of Patent Appeals and Interferences cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies. 5 U.S.C.A. § 706(2); 35 U.S.C.A. § 103.

**[17] Administrative Law and Procedure 15A ↪326**

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(A) In General

15Ak326 k. Law Questions in General.  
Most Cited Cases

**Administrative Law and Procedure 15A ↪485**

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak484 Findings  
15Ak485 k. Necessity and Purpose.  
Most Cited Cases

**Administrative Law and Procedure 15A ↪507**

15A Administrative Law and Procedure

15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents

15AIV(D) Hearings and Adjudications

15Ak507 k. Report or Opinion; Reasons  
for Decision. Most Cited Cases

Sound administrative procedure requires that an agency apply the law in accordance with statute and precedent; the agency tribunal must make findings of relevant facts, and present its reasoning in sufficient detail that the court may conduct meaningful review of the agency action. 5 U.S.C.A. § 706(2).

**Patents 291 ↪328(2)**

291 Patents

291XIII Decisions on the Validity, Construction, and Infringement of Particular Patents

291k328 Patents Enumerated

291k328(2) k. Original Utility. Most

Cited Cases

4,626,892. Cited As Prior Art.

\***1340** Richard H. Stern, of Washington, DC, argued for Sang Su Lee. With him on the brief was Robert E. Bushnell.

Sidney O. Johnson, Jr., Associate Solicitor, of Arlington, Virginia, argued for the Director of the U.S. Patent and Trademark Office. With him on the brief were John M. Whealan, Solicitor, and Raymond T. Chen, Associate Solicitor. Of counsel were Maximilian R. Peterson and Mark Nagumo, Associate Solicitors.

Before PAULINE NEWMAN, CLEVENGER, and DYK, Circuit Judges.

PAULINE NEWMAN, Circuit Judge.

Sang-Su Lee appeals the decision of the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office, rejecting all of the claims of Lee's patent application Serial No. 07/631,210 entitled "Self-Diagnosis and Sequential-Display Method of Every Function." ENL We vacate the Board's decision for failure to meet the adjudicative standards for review under the Administrative Procedure Act, and remand for further proceedings.

ENL *Ex parte Lee*, No.1994-1989 (Bd. Pat.App. & Int. Aug. 30, 1994; on reconsider'n Sept. 29, 1999).

**The Prosecution Record**

Mr. Lee's patent application is directed to a method of automatically displaying the functions of a video display device and demonstrating how to select and adjust the functions in order to facilitate response by the user. The display and demonstration are achieved using computer-managed electronics, including pulse-width modulation and auto-fine-tuning pulses, in accordance with procedures described in the specification. Claim 10 is repres-

entative:

10. A method for automatically displaying functions of a video display device, comprising: determining if a demonstration mode is selected; if said demonstration mode is selected, automatically entering a picture adjustment mode having a picture menu screen displaying a list of a plurality of picture functions; and automatically demonstrating selection and adjustment of individual ones of said plurality of picture functions.

The examiner rejected the claims on the ground of obviousness, citing the combination of two references: United States Patent No. 4,626,892 to Nortrup, and the Thunderchopper Helicopter Operations \***1341** Handbook for a video game. The Nortrup reference describes a television set having a menu display by which the user can adjust various picture and audio functions; however, the Nortrup display does not include a demonstration of how to adjust the functions. The Thunderchopper Handbook describes the Thunderchopper game's video display as having a "demonstration mode" showing how to play the game; however, the Thunderchopper Handbook makes no mention of the adjustment of picture or audio functions. The examiner held that it would have been obvious to a person of ordinary skill to combine the teachings of these references to produce the Lee system.

Lee appealed to the Board, arguing that the Thunderchopper Handbook simply explained how to play the Thunderchopper game, and that the prior art provided no teaching or motivation or suggestion to combine this reference with Nortrup, or that such combination would produce the Lee invention. The Board held that it was not necessary to present a source of a teaching, suggestion, or motivation to combine these references or their teachings. The Board stated:

The conclusion of obviousness may be made from common knowledge and common sense of a person of ordinary skill in the art without any specific hint or suggestion in a particular reference.

Board op. at 7. The Board did not explain the

“common knowledge and common sense” on which it relied for its conclusion that “the combined teachings of Nortrup and Thunderchopper would have suggested the claimed invention to those of ordinary skill in the art.”

Lee filed a request for reconsideration, to which the Board responded after five years. The Board reaffirmed its decision, stating that the Thunderchopper Handbook was “analogous art” because it was “from the same field of endeavor” as the Lee invention, and that the field of video games was “reasonably pertinent” to the problem of adjusting display functions because the Thunderchopper Handbook showed video demonstrations of the “features” of the game. On the matter of motivation to combine the Nortrup and Thunderchopper references, the Board stated that “we maintain the position that we stated in our prior decision” and that the Examiner’s Answer provided “a well reasoned discussion of why there is sufficient motivation to combine the references.” The Board did not state the examiner’s reasoning, and review of the Examiner’s Answer reveals that the examiner merely stated that both the Nortrup function menu and the Thunderchopper demonstration mode are program features and that the Thunderchopper mode “is user-friendly” and it functions as a tutorial, and that it would have been obvious to combine them.

Lee had pressed the examiner during prosecution for some teaching, suggestion, or motivation in the prior art to select and combine the references that were relied on to show obviousness. The Examiner’s Answer before the Board, plus a Supplemental Answer, stated that the combination of Thunderchopper with Nortrup “would have been obvious to one of ordinary skill in the art since the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software,” and that “another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial.” The Board adopted the examiner’s answer, stating “the examiner has provided a well reasoned discussion of these references and how the combin-

ation of these references meets the claim limitations.” However, perhaps recognizing that the examiner had provided insufficient justification to \*1342 support combining the Nortrup and Thunderchopper references, the Board held, as stated *supra*, that a “specific hint or suggestion” of motivation to combine was not required.

This appeal followed.

### *Judicial Review*

[1] Tribunals of the PTO are governed by the Administrative Procedure Act, and their rulings receive the same judicial deference as do tribunals of other administrative agencies. Dickinson v. Zurko, 527 U.S. 150, 119 S.Ct. 1816, 144 L.Ed.2d 143, 50 USPQ2d 1930 (1999). Thus on appeal we review a PTO Board’s findings and conclusions in accordance with the following criteria:

5 U.S.C. § 706(2) The reviewing court shall-

(2) hold unlawful and set aside agency actions, findings, and conclusions found to be-

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;

\* \* \* \* \*

(E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute;

[2][3] For judicial review to be meaningfully achieved within these strictures, the agency tribunal must present a full and reasoned explanation of its decision. The agency tribunal must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts. The Court has often explained:

The Administrative Procedure Act, which governs the proceedings of administrative agencies and related judicial review, establishes a scheme of “reasoned decisionmaking.” Not only must an agency’s decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational.

Allentown Mack Sales and Service, Inc. v. National Labor Relations Bd., 522 U.S. 359, 374, 118 S.Ct. 818, 139 L.Ed.2d 797 (1998) (citation omitted). This standard requires that the agency not only have reached a sound decision, but have articulated the reasons for that decision. The reviewing court is thus enabled to perform meaningful review within the strictures of the APA, for the court will have a basis on which to determine “whether the decision was based on the relevant factors and whether there has been a clear error of judgment.” Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 416, 91 S.Ct. 814, 28 L.Ed.2d 136 (1971). Judicial review of a Board decision denying an application for patent is thus founded on the obligation of the agency to make the necessary findings and to provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions. See In re Zurko, 258 F.3d 1379, 1386, 59 USPO2d 1693, 1697 (Fed.Cir.2001) (review is on the administrative record); In re Garzside, 203 F.3d 1305, 1314, 53 USPO2d 1769, 1774 (Fed.Cir.2000) (Board decision “must be justified within the four corners of the record”).

[4][5] As applied to the determination of patentability *vel non* when the issue is obviousness, “it is fundamental that rejections under 35 U.S.C. § 103 must be based on evidence comprehended by the language of that section.” In re Grasselli, 713 F.2d 731, 739, 218 USPO 769, 775 (Fed.Cir.1983). The essential factual evidence on the issue of obviousness is set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPO 459, 467 (1966) and extensive ensuing precedent. The patent examination\*1343 process centers on prior art and the analysis thereof. When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 USPO2d 1001, 1008 (Fed.Cir.2001) (“the central question is whether there is reason to combine [the] refer-

ences,” a question of fact drawing on the *Graham* factors).

[6] “The factual inquiry whether to combine references must be thorough and searching.” *Id.* It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 USPO2d 1456, 1459 (Fed.Cir.2000) (“a showing of a suggestion, teaching, or motivation to combine the prior art references is an ‘essential component of an obviousness holding’”) (quoting C.R. Bard, Inc. v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 USPO2d 1225, 1232 (Fed.Cir.1998)); In re Dembiczak, 175 F.3d 994, 999, 50 USPO2d 1614, 1617 (Fed.Cir.1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.”); In re Dance, 160 F.3d 1339, 1343, 48 USPO2d 1635, 1637 (Fed.Cir.1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 USPO2d 1596, 1600 (Fed.Cir.1988) (“‘teachings of references can be combined *only* if there is some suggestion or incentive to do so.’”) (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPO 929, 933 (Fed.Cir.1984)).

The need for specificity pervades this authority. See, e.g., In re Kotzab, 217 F.3d 1365, 1371, 55 USPO2d 1313, 1317 (Fed.Cir.2000) (“particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed”); In re Rouffet, 149 F.3d 1350, 1359, 47 USPO2d 1453, 1459 (Fed.Cir.1998) (“even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary

skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.”); In re Fritch, 972 F.2d 1260, 1265, 23 USPO2d 1780, 1783 (Fed.Cir.1992) (the examiner can satisfy the burden of showing obviousness of the combination “only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references”).

[7][8][9] With respect to Lee's application, neither the examiner nor the Board adequately supported the selection and combination of the Nortrup and Thunderchopper references to render obvious that which Lee described. The examiner's conclusory statements that “the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software” and that “another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial” do not adequately address the issue of motivation to combine. This factual question \*1344 of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to “[use] that which the inventor taught against its teacher.” W.L. Gore v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPO 303, 312-13 (Fed.Cir.1983). Thus the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion.

[10] Deferential judicial review under the Administrative Procedure Act does not relieve the agency of its obligation to develop an evidentiary basis for its findings. To the contrary, the Administrative Procedure Act reinforces this obligation. See, e.g., Motor Vehicle Manufacturers Ass'n v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983) (“the agency must examine the relevant data and articulate a satisfactory

explanation for its action including a ‘rational connection between the facts found and the choice made.’”) (quoting Burlington Truck Lines v. United States, 371 U.S. 156, 168, 83 S.Ct. 239, 9 L.Ed.2d 207 (1962)); Securities & Exchange Comm'n v. Chenery Corp., 318 U.S. 80, 94, 63 S.Ct. 454, 87 L.Ed. 626 (1943) (“The orderly function of the process of review requires that the grounds upon which the administrative agency acted are clearly disclosed and adequately sustained.”).

[11] In its decision on Lee's patent application, the Board rejected the need for “any specific hint or suggestion in a particular reference” to support the combination of the Nortrup and Thunderchopper references. Omission of a relevant factor required by precedent is both legal error and arbitrary agency action. See Motor Vehicle Manufacturers, 463 U.S. at 43, 103 S.Ct. 2856 (“an agency rule would be arbitrary and capricious if the agency ... entirely failed to consider an important aspect of the problem”); Mullins v. Department of Energy, 50 F.3d 990, 992 (Fed.Cir.1995) (“It is well established that agencies have a duty to provide reviewing courts with a sufficient explanation for their decisions so that those decisions may be judged against the relevant statutory standards, and that failure to provide such an explanation is grounds for striking down the action.”). As discussed in National Labor Relations Bd. v. Ashkenazy Property Mgt. Corp., 817 F.2d 74, 75 (9th Cir.1987), an agency is “not free to refuse to follow circuit precedent.”

[12] The foundation of the principle of judicial deference to the rulings of agency tribunals is that the tribunal has specialized knowledge and expertise, such that when reasoned findings are made, a reviewing court may confidently defer to the agency's application of its knowledge in its area of expertise. Reasoned findings are critical to the performance of agency functions and judicial reliance on agency competence. See Baltimore and Ohio R.R. Co. v. Aberdeen & Rockfish R.R. Co., 393 U.S. 87, 91-92, 89 S.Ct. 280, 21 L.Ed.2d 219 (1968) (absent reasoned findings based on substantial evidence effective review would become lost “in the haze of

so-called expertise”). The “common knowledge and common sense” on which the Board relied in rejecting Lee’s application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. Conclusory statements such as those here provided do not fulfill the agency’s obligation. This court explained in Zurko, 258 F.3d at 1385, 59 USPO2d at 1697, that “deficiencies of the cited references cannot be remedied by the Board’s general conclusions about what is ‘basic knowledge’ or ‘common sense.’ ” The \*1345 Board’s findings must extend to all material facts and must be documented on the record, lest the “haze of so-called expertise” acquire insulation from accountability. “Common knowledge and common sense,” even if assumed to derive from the agency’s expertise, do not substitute for authority when the law requires authority. See Allentown Mack, 522 U.S. at 376, 118 S.Ct. 818 (“Because reasoned decisionmaking demands it, and because the systemic consequences of any other approach are unacceptable, the Board must be required to apply in fact the clearly understood legal standards that it enunciates in principle....”)

The case on which the Board relies for its departure from precedent, In re Bozek, 57 C.C.P.A. 713, 416 F.2d 1385, 163 USPO 545 (1969), indeed mentions “common knowledge and common sense,” the CCPA stating that the phrase was used by the Solicitor to support the Board’s conclusion of obviousness based on evidence in the prior art. Bozek did not hold that common knowledge and common sense are a substitute for evidence, but only that they may be applied to analysis of the evidence. Bozek did not hold that objective analysis, proper authority, and reasoned findings can be omitted from Board decisions. Nor does Bozek, after thirty-two years of isolation, outweigh the dozens of rulings of the Federal Circuit and the Court of Customs and Patent Appeals that determination of patentability must be based on evidence. This court has remarked, in Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc., 183 F.3d 1347, 1356, 51 USPO2d 1415, 1421 (Fed.Cir.1999), that Bozek’s reference to common knowledge “does not in and of itself make it so” absent evidence of such know-

ledge.

[13][14][15][16] The determination of patentability on the ground of unobviousness is ultimately one of judgment. In furtherance of the judgmental process, the patent examination procedure serves both to find, and to place on the official record, that which has been considered with respect to patentability. The patent examiner and the Board are deemed to have experience in the field of the invention; however, this experience, insofar as applied to the determination of patentability, must be applied from the viewpoint of “the person having ordinary skill in the art to which said subject matter pertains,” the words of section 103. In finding the relevant facts, in assessing the significance of the prior art, and in making the ultimate determination of the issue of obviousness, the examiner and the Board are presumed to act from this viewpoint. Thus when they rely on what they assert to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record. The failure to do so is not consistent with either effective administrative procedure or effective judicial review. The board cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies.

#### *Alternative Grounds*

At oral argument the PTO Solicitor proposed alternative grounds on which this court might affirm the Board’s decision. However, as stated in Burlington Truck Lines, Inc. v. United States, 371 U.S. 156, 168, 83 S.Ct. 239, 9 L.Ed.2d 207 (1962), “courts may not accept appellate counsel’s *post hoc* rationalization for agency action.” Consideration by the appellate tribunal of new agency justifications deprives the aggrieved party of a fair opportunity to support its position; thus review of an administrative decision must be made on the grounds relied on by the agency. “If those grounds are inadequate or improper, the court is powerless to affirm the administrative action by substituting what it considers\*1346 to be a more adequate or proper basis.” Securities & Exchange Comm’n v. Chenery

Corp., 332 U.S. 194, 196, 67 S.Ct. 1575, 91 L.Ed. 1995 (1947). As reiterated in Federal Election Comm'n v. Akins, 524 U.S. 11, 25, 118 S.Ct. 1777, 141 L.Ed.2d 10 (1998), "If a reviewing court agrees that the agency misinterpreted the law, it will set aside the agency's action and remand the case-even though the agency (like a new jury after a mistrial) might later, in the exercise of its lawful discretion, reach the same result for a different reason." Thus we decline to consider alternative grounds that might support the Board's decision.

*Further Proceedings*

[17] Sound administrative procedure requires that the agency apply the law in accordance with statute and precedent. The agency tribunal must make findings of relevant facts, and present its reasoning in sufficient detail that the court may conduct meaningful review of the agency action. In Radio-Television News Directors Ass'n v. FCC, 184 F.3d 872 (D.C.Cir.1999) the court discussed the "fine line between agency reasoning that is 'so crippled as to be unlawful' and action that is potentially lawful but insufficiently or inappropriately explained," quoting from Checkosky v. Securities & Exch. Comm'n., 23 F.3d 452, 464 (D.C.Cir.1994); the court explained that "[i]n the former circumstance, the court's practice is to vacate the agency's order, while in the latter the court frequently remands for further explanation (including discussion of the relevant factors and precedents) while withholding judgment on the lawfulness of the agency's proposed action." *Id.* at 888. In this case the Board's analysis of the Lee invention does not comport with either the legal requirements for determination of obviousness or with the requirements of the Administrative Procedure Act that the agency tribunal set forth the findings and explanations needed for "reasoned decisionmaking." Remand for these purposes is required. See Overton Park, 401 U.S. at 420-421, 91 S.Ct. 814 (remanding for further proceedings appropriate to the administrative process).

VACATED AND REMANDED.

C.A.Fed.,2002.

In re Sang Su Lee  
277 F.3d 1338, 61 U.S.P.Q.2d 1430

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In re Jones

C.A.Fed., 1992.

United States Court of Appeals, Federal Circuit.

In re Rita S. JONES, Michael T. Chirchirillo and

Johnny L. Burns.

No. 91-1380.

Feb. 28, 1992.

The Patent and Trademark Office, Board of Patent Appeals, rejected claim of patent and appeal was taken. The Court of Appeals, Rich, Circuit Judge, held that salt of acid commonly known as "dicamba" was not obvious.

Reversed.

West Headnotes

[1] Patents 291 ↪ 16.25

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k16.25 k. Chemical Compounds. MostCited Cases

Patent and Trademark Office failed to present prima facie case of obviousness with respect to patent claim for novel salt of acid commonly referred to as "dicamba," used as herbicide; claimed salt was primary amine with ether linkage, structurally different from di-ethanolamino salt disclosed by closet prior art, which was secondary amine without ether linkage, and there was no evidence that one of ordinary skill in herbicidal art would have been motivated to make modifications of prior art salt needed to arrive at claimed salt. 35 U.S.C.A. § 103.

[2] Patents 291 ↪ 16.25

291 Patents

291II Patentability

291II(A) Invention; Obviousness

291k16.25 k. Chemical Compounds. MostCited Cases

Disclosure of chemical genus does not render obvious

any species that happens to fall within it.

[3] Patents 291 ↪ 114.16

291 Patents

291IV Applications and Proceedings Thereon

291k114.15 Hearing and Scope of Inquiry

291k114.16 k. In General; Trial De Novo.

Most Cited Cases

(Formerly 291k114.15)

Before Patent and Trademark Office may combine disclosures of two or more prior art references in order to establish prima facie obviousness, there must be some suggestion for doing so, found either in references themselves or in knowledge generally available to one of ordinary skill in art. 35 U.S.C.A. § 103.

\*348 Melvyn M. Kassenoff, Sandoz Corp. Patent & Trademark Dept., East Hanover, N.J., argued for appellant; Gerald D. Sharkin and Richard E. Vila, East Hanover, N.J. and Joanne M. Giesser, Palo Alto, Cal., on brief.

Harris A. Pitlock, Associate Sol., Arlington, Va., argued for appellee; Fred E. McKelvey, Sol., on brief (Richard E. Schafer, Patent & Trademark Office, of counsel).

Before RICH, ARCHER, and CLEVENGER, Circuit Judges.

RICH, Circuit Judge.

Rita S. Jones et al. (collectively Jones) appeal from the April 15, 1991 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), Appeal No. 90-1920, sustaining the rejection of claim 1, the only claim of application Ser. No. 07/099,279, titled "The 2-(2 -Aminoethoxy)-Ethanol Salt of Dicamba," as unpatentable under 35 U.S.C. § 103. We conclude that the PTO has not presented a *prima facie* case of obviousness, and therefore *reverse*.

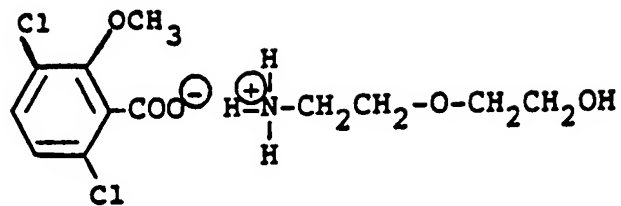
*The Invention*

The claimed invention is a novel salt of 2-methoxy-3,6-dichlorobenzoic acid, which acid is commonly referred to as "dicamba." A known herbicide, dicamba has typically been sold in the form of its known dimethylamine salt.



The sole claim of the application on appeal reads:

1. The 2-(2 -aminoethoxy) ethanol salt of dicamba. The claimed salt has the following structure:



*\*349 The Rejection*

Claim 1 stands rejected as obvious in view of the combined teachings of the following references:

Richter U.S. Patent Dec. 12,  
No. 1961  
3,013,054

Moyle et al. U.S. Patent Oct. 2,  
No. 1962  
3,056,669

Balassa U.S. Patent Apr. 3,  
No. 1973  
3,725,031

Zorayan et 88 Chem. 1978  
al. Abstracts  
No. 52300j

Wideman 86 Chem. 1977  
Abstracts  
No. 43711a

### Analysis

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Richter, which all agree is the closest prior art, discloses dicamba in free acid, ester, and salt forms, for use as a herbicide. Among the salt forms disclosed are substituted ammonium salts, a genus which admittedly encompasses the claimed salt. Richter does not specifically disclose the claimed 2-(2 -aminoethoxy) ethanol salt, however. Most notably, Richter discloses (emphasis and bracketed word ours):

Compositions in which X is substituted ammonium are amine salts of 2-methoxy-3,6-dichlorobenzoic acid [dicamba] and are prepared by the addition of the free acid to various amines. Typical amines which can be used to prepare such amine salts are dimethylamine, trimethylamine, triethylamine, diethanolamine, triethanolamine, isopropylamine, morpholine, and the like. *The resulting products are, respectively, the dimethylamino, trimethylamino, triethylamino, diethanolamino, triethanolamino, isopropylamino, and morpholino salts of 2-methoxy-3,6-dichlorobenzoic acid.*

Zorayan teaches the amine ( $\text{H}_2\text{N}(\text{CH}_2\text{CH}_2\text{O})_2\text{H}$ ) used to make the claimed salt, as well as the use of that amine in the preparation of surfactants for shampoos, bath preparations, and emulsifiers.

Wideman also teaches the amine disclosed in Zorayan.

The content of the remaining references is unnecessary to our decision.

The Board upheld the examiner's rejection of claim 1 as obvious, finding that the claimed 2-(2 -aminoethoxy) ethanol salt of dicamba and the diethanolamine salt of dicamba specifically disclosed by Richter were "closely related in structure," and that based upon the expectation that "compounds similar in structure will have similar properties," a *prima facie* case of obviousness had arisen. The Board found that Jones' rebuttal evidence (Rule 132 declarations and data reported in the specification) failed to "compare the claimed subject matter with the closest prior art," and accordingly did not serve to rebut the *prima facie* case. This appeal followed.

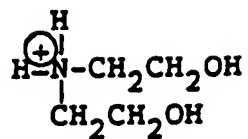
[1][2] The Solicitor contends that the claimed salt falls within the genus of substituted amine salts of dicamba disclosed by Richter, and that, like Richter's genus, the claimed compound has herbicidal activity. Thus, the Solicitor urges, under the circumstances of this case, (1) the genus/species relationship and (2) the common utility of the claimed and prior art compounds support the Board's holding of *prima facie* obviousness. Moreover, the Solicitor adds, although the claimed compound is neither a homolog nor a position isomer of those salts specifically disclosed in Richter, it is structurally similar thereto, particularly the diethanolamino salt noted by the Board.

The question of "structural similarity" in chemical patent cases has generated a body of patent law unto itself.<sup>FN1</sup> Particular types \*350 or categories of structural similarity without more have, in past cases, given rise to *prima facie* obviousness; see, e.g., *In re Dillon*, 919 F.2d 688, 692-94, 16 USPO2d 1897, 1900-02 (Fed.Cir.1990) (tri-orthoesters and tetra-orthoesters), *cert. denied*, 500 U.S. 904, 111 S.Ct. 1682, 114 L.Ed.2d 77 (1991); *In re May*, 574 F.2d 1082, 197 USPO 601 (CCPA 1978) (stereoisomers); *In re Wilder*, 563 F.2d 457, 195 USPO 426 (CCPA 1977) (adjacent homologs and structural isomers); *In re Hoch*, 428 F.2d 1341, 166 USPO 406 (CCPA 1970) (acid and ethyl ester). However, none of these types of structural similarity are involved here. And in any event, this court has previously stated that generalization is to be avoided insofar as specific structures are alleged to be *prima facie* obvious one from the other. *In re Grabiak*, 769 F.2d 729, 731, 226 USPO 870, 872 (Fed.Cir.1985).

<sup>FN1</sup>. See generally Helmuth A. Wegner, "Prima Facie Obviousness of Chemical Compounds," 6 *Am.Pat.L.Assoc.Q.J.* 271 (1978).

On the basis of the record before us, we cannot sustain the Board's conclusion that the claimed salt and the diethanolamino salt disclosed by Richter are so "closely related in structure" as to render the former *prima facie* obvious in view of the latter. The claimed salt is a

primary amine with an ether linkage. The diethanolamino salt disclosed by Richter is a secondary amine, without an ether linkage:



In addition, the only substituted ammonium salt of dicamba expressly disclosed by Richter having an ether linkage is the morpholino salt, which is *cyclic* in structure:

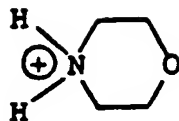


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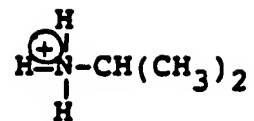
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(Cite as: 958 F.2d 347)



The claimed salt is, plainly, *acyclic*; i.e., linear. Lastly, while the isopropylamino salt disclosed by Richter is a primary amine, as is the claimed salt, its iso- structure is quite different:



The lack of close similarity of structure is not negated by the fact that the claimed salt is a member of Richter's broadly disclosed genus of substituted ammonium salts of dicamba. The Solicitor contends that "[t]he relative size of the genus disclosed by the prior art would not appear to be a controlling factor in determining whether a *prima facie* case of obviousness exists for a species encompassed within the described genus," citing Merck & Co. v. Biocraft Labs., Inc., 874 F.2d 804, 806-09, 10 USPQ2d 1843, 1845-48 (Fed.Cir.), cert. denied, 493 U.S. 975, 110 S.Ct. 498, 107 L.Ed.2d 502 (1989). We decline to extract from Merck the rule that the Solicitor appears to suggest—that regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it. In Merck, at issue on appeal was whether claims to a composition of two diuretics, amiloride and hydrochlorothiazide, present in a particular "medically synergistic" weight ratio, would have been obvious in view of a specific prior art disclosure of amiloride in combination with hydrochlorothiazide, one of 1200 such combinations disclosed in the prior art reference. *Id.* at 806, 10 USPQ2d at 1845. Based on the facts before it, including evidence at trial that the experimentation needed to arrive at the claimed dosage was "nothing more than routine," *id.* at 809, 10 USPQ2d at 1847, the court held that the claimed invention would have been obvious. In contrast, though Richter discloses the potentially infinite genus of "substituted ammonium salts" of dicamba, and lists several such salts, the salt claimed here is not specifically disclosed. Nor, as we have explained above, is the claimed salt sufficiently similar in structure to those specifically disclosed in Richter as to render it *prima facie* obvious. Every case, particularly those raising the issue of obviousness under section 103, must necessarily be decided upon its own facts.

[3] \*351 The Solicitor points out that, given the breadth of forms of dicamba (free acid, ester, or salt) disclosed by Richter as having herbicidal utility, one of ordinary skill in the art would appreciate that the dicamba group has significance with respect to imparting herbicidal activity to dicamba compounds. Thus, the Solicitor contends, one skilled in the art would have been motivated to use, with dicamba, substituted ammonium salts made

from a known amine, such as the amine disclosed by Zorayan and Wideman, and would have expected such a salt to have herbicidal activity. Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed.Cir.1988). We see no such suggestion in Zorayan, which is directed to shampoo additives, nor in Wideman, which teaches that the amine used to make the claimed compound is a byproduct of the production of morpholine. Nor does the broad disclosure of Richter fill the gap, for the reasons discussed above.

Conspicuously missing from this record is any *evidence*, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art salts necessary to arrive at the claimed 2-(2 -aminoethoxy) ethanol salt. See Grahak, 769 F.2d at 731-32, 226 USPO at 872 ("[I]n the case before us there must be adequate support in the prior art for the [prior art] ester/ [claimed] thioester change in structure, in order to complete the PTO's *prima facie* case and shift the burden of going forward to the applicant."); In re Lulu, 747 F.2d 703, 705, 223 USPO 1257, 1258 (Fed.Cir.1984) ("The prior art must provide one of ordinary skill in the art the motivation to make the proposed molecular modifications needed to arrive at the claimed compound.")

### Conclusion

We conclude that the PTO did not establish a *prima facie* case of obviousness, and thus did not shift to Jones the burden of coming forward with unexpected results or other objective evidence of non-obviousness. Accordingly, the decision of the Board is

REVERSED.

C.A.Fed., 1992.

In re Jones

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(Cite as: **958 F.2d 347**)

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**C**

In re Fine

C.A.Fed., 1988.

United States Court of Appeals, Federal Circuit.

In re David H. FINE

No. 87-1319.

Jan. 26, 1988.

The Board of Patent Appeals and Interferences of the United States Patent and Trademark Office affirmed rejection of claims of application for patent for system for detecting and measuring minute quantities of nitrogen compounds, and applicant appealed. The Court of Appeals, Mayer, Circuit Judge, held that: (1) it would not have been obvious to substitute nitric oxide detector for sulfur dioxide detector in prior system, and (2) sulfur detection system did not teach use of claimed temperature range.

Reversed.

Edward S. Smith, Circuit Judge, dissented and filed opinion.

West Headnotes

**[1] Patents 291 ↪ 16.33****291 Patents****291III Patentability****291III(A) Invention; Obviousness**

**291k16.33** k. Measuring, Testing and Indicating Devices. Most Cited Cases

System for detecting and measuring minute quantities of nitrogen compounds was not obvious in light of prior art for separating, identifying, and monitoring sulfur compounds or method for measuring chemiluminescence of reaction between nitric oxide and ozone which required continuous flowing of gaseous mixture into reaction chamber; method for measuring sulfur deliberately sought to avoid nitrogen compounds, and claimed invention retained each nitrogen compound constituent of gaseous sample in chromatograph for individual time period. 35 U.S.C.A. § 103.

**[2] Patents 291 ↪ 114.19****291 Patents****291IV Applications and Proceedings Thereon****291k114.15** Hearing and Scope of Inquiry

**291k114.19** k. Presumptions and Burden of Proof. Most Cited Cases

**Patents 291 ↪ 114.21****291 Patents****291IV Applications and Proceedings Thereon****291k114.15** Hearing and Scope of Inquiry

**291k114.21** k. Weight and Sufficiency of Evidence. Most Cited Cases

Patent and Trademark Office has burden to establish prima facie case of obviousness, which it may satisfy only by showing some objective teaching in prior art, or that knowledge generally available to one of ordinary skill and art would lead that individual to combined relevant teachings of references. 35 U.S.C.A. § 103.

**[3] Patents 291 ↪ 26(1)****291 Patents****291III Patentability****291III(A) Invention; Obviousness****291k26** Combination

**291k26(1)** k. In General. Most Cited Cases

Whether particular combination might be "obvious to try" is not legitimate test of patentability. 35 U.S.C.A. § 103.

**[4] Patents 291 ↪ 16.5(1)****291 Patents****291III Patentability****291III(A) Invention; Obviousness**

**291k16.5** State of Prior Art and Advancement Therein

**291k16.5(1)** k. In General. Most Cited Cases

(Formerly 291k16.5)

Patent which described preferred temperature range

for separating, identifying and quantitatively monitoring sulfur compounds could be distinguished from claimed method for detecting and measuring minute quantities of nitrogen compounds which limited temperature to prevent nitrogen from other sources, where purpose of temperature limitation in prior art was to avoid formation of unwanted sulfides.

#### Patents 291 328(2)

##### 291 Patents

291 XIII Decisions on the Validity, Construction, and Infringement of Particular Patents

##### 291k328 Patents Enumerated

291k328(2) k. Original Utility. Most

##### Cited Cases

3,207,585, 3,650,696, 3,746,513. Cited as prior art.

\*1072 Morris Relson, Darby & Darby, P.C., New York City, for appellant. With him on the brief was Beverly B. Goodwin.

Lee E. Barrett, Associate Sol., Office of the Solicitor, Arlington, Va., for appellee. With him on the brief were Joseph F. Nakamura, Sol. and Fred E. McKelvey, Deputy Sol.

Before FRIEDMAN, SMITH and MAYER, Circuit Judges.

#### OPINION

MAYER, Circuit Judge.

David H. Fine appeals from a decision of the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office (Board) affirming the rejection of certain claims of his application, Serial No. 512,374, and concluding that his invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C. § 103. We reverse.

#### BACKGROUND

##### A. The Invention.

The invention claimed is a system for detecting and measuring minute quantities of nitrogen compounds. According to Fine, the system has the abil-

ity to detect the presence of nitrogen compounds in quantities as minute as one part in one billion, and is an effective means to detect drugs and explosives, which emanate nitrogen compound vapors even when they are concealed in luggage and closed containers.

The claimed invention has three major components: (1) a gas chromatograph which separates a gaseous sample into its constituent parts; (2) a converter which converts the nitrogen compound effluent output of the chromatograph into nitric oxide in a hot, oxygen-rich environment; and (3) a detector for measuring the level of nitric oxide. The claimed invention's sensitivity is achieved by combining nitric oxide with ozone to produce nitrogen dioxide which concurrently causes a detectable luminescence. The luminescence, which is measured by a visual detector, shows the level of nitric oxide which in turn is a measure of nitrogen compounds found in the sample.

The appealed claims were rejected by the Patent and Trademark Office (PTO) under 35 U.S.C. § 103. Claims 60, 63, 77 and 80 were rejected as unpatentable over Eads, Patent No. 3,650,696 (Eads) in view of Warnick, et al., Patent No. 3,746,513 (Warnick). Claims 62, 68, 69, 79, 85 and 86 were rejected as unpatentable over Eads and Warnick in view of Glass, et al., Patent No. 3,207,585 (Glass).

##### B. The Prior Art.

###### 1. *Eads Patent.*

Eads discloses a method for separating, identifying and quantitatively monitoring \*1073 sulfur compounds. The Eads system is used primarily in "air pollution control work in the scientific characterization of odors from sulfur compounds."

The problem addressed by Eads is the tendency of sulfur compounds "to adhere to or react with the surface materials of the sampling and analytical equipment, and/or react with the liquid or gaseous materials in the equipment." Because of this, the accuracy of measurement is impaired. To solve the problem, the Eads system collects an air sample

containing sulfur compounds in a sulfur-free methanol solution. The liquid is inserted into a gas chromatograph which separates the various sulfur compounds. The compounds are next sent through a pyrolysis furnace where they are oxidized to form sulfur dioxide. Finally, the sulfur dioxide passes through a measuring device called a microcoulometer which uses titration cells to calculate the concentration of sulfur compounds in the sample.

## 2. Warnick Patent.

Warnick is directed to a means for detecting the quantity of pollutants in the atmosphere. By measuring the chemiluminescence of the reaction between nitric oxide and ozone, the Warnick device can detect the concentration of nitric oxide in a sample gaseous mixture.

Warnick calls for "continuously flowing" a sample gaseous mixture and a reactant containing ozone into a reaction chamber. The chemiluminescence from the resulting reaction is transmitted through a light-transmitting element to produce continuous readouts of the total amount of nitric oxide present in the sample.

## 3. Glass Patent.

The invention disclosed in Glass is a device for "completely burning a measured amount of a substance and analyzing the combustion products." A fixed amount of a liquid petroleum sample and oxygen are supplied to a flame. The flame is then spark-ignited, causing the sample to burn. The resulting combustion products are then collected and measured, and from this measurement the hydrogen concentration in the sample is computed.

## C. The Rejection.

The Examiner rejected claims 60, 63, 77 and 80 because "substitution of the [nitric oxide] detector of Warnick for the sulfur detector of Eads would be an obvious consideration if interested in nitrogen compounds, and would yield the claimed invention." He further asserted that "Eads teaches the [claimed] combination of chromatograph, combustion, and

detection, in that order.... Substitution of detectors to measure any component of interest is well within the skill of the art." In rejecting claims 62, 68, 69, 79, 85 and 86, the Examiner said, "Glass et al. teach a flame conversion means followed by a detector, and substitution of the flame conversion means of Glass et al. for the furnace of Eads would be an obvious equivalent and would yield the claimed invention." The Board affirmed the Examiner's rejection.

## DISCUSSION

### A. Standard of Review.

Obviousness under 35 U.S.C. § 103 is " 'a legal conclusion based on factual evidence.' " Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1535, 218 USPO 871, 876 (Fed.Cir.1983) (quoting Stevenson v. Int'l Trade Comm'n., 612 F.2d 546, 549, 204 USPO 276, 279 (CCPA 1979)). Therefore, an obviousness determination is not reviewed under the clearly erroneous standard applicable to fact findings, Raytheon Co. v. Roper Corp., 724 F.2d 951, 956, 220 USPO 592, 596 (Fed.Cir.1983); it is "reviewed for correctness or error as a matter of law." In re De Blauwe, 736 F.2d 699, 703, 222 USPO 191, 195 (Fed.Cir.1984).

To reach a proper conclusion under § 103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made. In light of *all* the evidence, the decisionmaker must then determine whether ... the claimed invention as a whole would have been \*1074 obvious at *that* time to *that* person. 35 U.S.C. § 103. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts.

Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1566, 1 USPO2d 1593, 1595-96 (Fed.Cir.1987).

### B. Prima Facie Obviousness.

Fine says the PTO has not established a *prima facie*



case of obviousness. He contends the references applied by the Board and Examiner were improperly combined, using hindsight reconstruction, without evidence to support the combination and in the face of contrary teachings in the prior art. He argues that the appealed claims were rejected because the PTO thought it would have been "obvious to try" the claimed invention, an unacceptable basis for rejection.

[1112] We agree. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. See In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPO 785, 787-88 (Fed.Cir.1984). It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Lulu, 747 F.2d 703, 705, 223 USPO 1257, 1258 (Fed.Cir.1984); see also Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297 n. 24, 227 USPO 657, 667 n. 24 (Fed.Cir.1985); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPO 929, 933 (Fed.Cir.1984). This it has not done. The Board points to nothing in the cited references, either alone or in combination, suggesting or teaching Fine's invention.

The primary basis for the Board's affirmance of the Examiner's rejection was that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. The Board reiterated the Examiner's bald assertion that "substitution of one type of detector for another in the system of Eads would have been within the skill of the art," but neither of them offered any support for or explanation of this conclusion.

Eads is limited to the analysis of sulfur compounds. The particular problem addressed there is the difficulty of obtaining precise measurements of sulfur compounds because of the tendency of sulfur dioxide to adhere to or react with the sampling analytic equipment or the liquid or gaseous materials in the equipment. It solves this problem by suggesting

that the gaseous sample containing sulfur compounds be absorbed into sulfur-free methanol and then inserted into a gas chromatograph to separate the sulfur compounds.

There is no suggestion in Eads, which focuses on the unique difficulties inherent in the measurement of sulfur, to use that arrangement to detect nitrogen compounds. In fact, Eads says that the presence of nitrogen is undesirable because the concentration of the titration cell components in the sulfur detector is adversely affected by substantial amounts of nitrogen compounds in the sample. So, instead of suggesting that the system be used to detect nitrogen compounds, Eads deliberately seeks to avoid them; it warns against rather than teaches Fine's invention. See W.L. Gore & Assoc. v. Garlock, Inc., 721 F.2d 1540, 1550, 220 USPO 303, 311 (Fed.Cir.1983) (error to find obviousness where references "diverge from and teach away from the invention at hand"). In the face of this, one skilled in the art would not be expected to combine a nitrogen-related detector with the Eads system. Accordingly, there is no suggestion to combine Eads and Warnick.

Likewise, the teachings of Warnick are inconsistent with the claimed invention, to some extent. The Warnick claims are directed to a gas stream from engine exhaust "continuously flowing the gaseous mixtures into the reaction chamber" to obtain "continuous readouts" of the amount of nitric oxide in the sample. In other words, it contemplates measuring the total amount of nitric oxide in a continuously flowing gaseous mixture of unseparated nitrogen constituents. By contrast, in Fine each \*1075 nitrogen compound constituent of the gaseous sample is retained in the chromatograph for an individual time period so that each exits in discrete, time-separated pulses. <sup>FN\*</sup> By this process, each constituent may be both identified by its position in time sequence, and measured. The claimed system, therefore, diverges from Warnick and teaches advantages not appreciated or contemplated by it.

<sup>FN\*</sup> The Solicitor argues that the contents

of Attachment C of Fine's brief were not before the Board and may not properly be considered here. However, we need not rely on Attachment C. It is merely illustrative of the qualitative separation of nitrogen compounds which occurs in Fine's system. The fact that the various constituents exit at discrete intervals is shown by the specification which was before the Board and which may appropriately be considered on appeal. See, e.g., Astra-Sienco, A.B. v. United States Int'l Trade Comm'n. 629 F.2d 682, 686, 207 USPO 1, 5 (CCPA 1980) (claims must be construed in light of specification).

[3] Because neither Warnick nor Eads, alone or in combination, suggests the claimed invention, the Board erred in affirming the Examiner's conclusion that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. ACS Hosp. Sys. 732 F.2d at 1575-77, 221 USPO at 931-33. The Eads and Warnick references disclose, at most, that one skilled in the art might find it obvious to try the claimed invention. But whether a particular combination might be "obvious to try" is not a legitimate test of patentability. In re Geiger, 815 F.2d 686, 688, 2 USPO2d 1276, 1278 (Fed.Cir.1987); In re Goodwin, 576 F.2d 375, 377, 198 USPO 1, 3 (CCPA 1978).

Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." In re Keller, 642 F.2d 413, 425, 208 USPO 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." ACS Hosp. Sys. 732 F.2d at 1577, 221 USPO at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none.

Instead, the Examiner relies on hindsight in reaching his obviousness determination. But this court

has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." W.L. Gore, 721 F.2d at 1553, 220 USPO at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made ... to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *Id.* One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

#### C. Advantage Not Appreciated by the Prior Art.

[4] The Board erred not only in improperly combining the Eads and Warnick references but also in failing to appreciate that the appealed claims can be distinguished over that combination. A material limitation of the claimed system is that the conversion to nitric oxide occur in the range of 600°> C to 1700°C. The purpose of this limitation is to prevent nitrogen from other sources, such as the air, from being converted to nitric oxide and thereby distorting the measurement of nitric oxide derived from the nitrogen compounds of the sample.

The claimed nitric oxide conversion temperature is not disclosed in Warnick. Although Eads describes a preferred temperature of 675°C to 725°> C, the purpose of this range is different from that of Fine. Eads requires the 675°C to 725°C range because it affords a temperature low enough to avoid formation of unwanted sulfur trioxide, yet high enough to avoid formation of unwanted sulfides. Fine's temperature \*1076 range, in contrast, does not seek to avoid the formation of sulfur compounds or even nitrogen compounds. It enables the system to break down the nitrogen compounds of the sample while avoiding the destruction of background nitrogen gas. There is a partial overlap, of course, but this is mere happenstance. Because the purposes of the

two temperature ranges are entirely unrelated, Eads does not teach use of the claimed range. See *In re Geiger*, 815 F.2d at 688, 2 USPQ2d at 1278. The Board erred by concluding otherwise.

D. Unexpected Results.

Because we reverse for failure to establish a *prima facie* case of obviousness, we need not reach Fine's contention that the Board failed to accord proper weight to the objective evidence of unexpected superior results. *Id.*

E. The "Flame" Claims.

Claims 62, 68, 69, 79, 85 and 86 relate to the oxygen-rich flame conversion means of the claimed invention. These "flame" claims depend from either apparatus claim 60 or method claim 77. Dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious. *Hartness Int'l. Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed.Cir.1987); *In re Abele*, 684 F.2d 902, 910, 214 USPO 682, 689 (CCPA 1982); see also *In re Sernaker*, 702 F.2d 989, 991, 217 USPO 1, 3 (Fed.Cir.1983). In view of our conclusion that claims 60 and 77 are nonobvious, the dependent "flame" claims are also patentable.

CONCLUSION

The Board's decision affirming the Examiner's rejection of claims 60, 62, 63, 68, 69, 77, 79, 80, 85 and 86 of Fine's application as unpatentable over the prior art under 35 U.S.C. § 103 is

REVERSED.

EDWARD S. SMITH, Circuit Judge, dissenting.  
I respectfully dissent. I am of the firm belief that the prior art references, relied upon by the PTO to establish its *prima facie* case of obviousness, in combination teach and suggest Fine's invention to one skilled in the art. Also, I firmly believe that Fine failed to rebut the PTO's *prima facie* case. On this basis, I would affirm the board's determination sustaining the examiner's rejection, pursuant to 35

U.S.C. § 103, of Fine's claims on appeal before this court.

C.A.Fed., 1988.

In re Fine

837 F.2d 1071, 5 U.S.P.Q.2d 1596

END OF DOCUMENT

**C**Briefs and Other Related Documents

United States Court of Appeals, Federal Circuit.  
 In re Denis ROUFFET, Yannick Tanguy and Frederic Berthault.  
 No. 97-1492.

July 15, 1998.

Applicants sought patent for invention claiming satellite technology to reduce number of necessary "handovers" between beams transmitted by single satellite. The Board of Patent Appeals and Interferences rejected application as obvious, and applicants appealed. The Court of Appeals, Rader, Circuit Judge, held that neither combination of two prior art patents and conference report nor combination of two other prior art patents rendered invention obvious, absent motivation to combine those references.

Reversed.

## West Headnotes

**[1] Patents 291 ☞ 112.3(2)**291 Patents291IV Applications and Proceedings Thereon291k112 Conclusiveness and Effect of Decisions of Patent Office291k112.3 As to Patentability291k112.3(2) k. Invention. Most Cited Cases

To reject claims in patent application as obvious, an examiner must show un rebutted prima facie case of obviousness; in absence of proper prima facie case, applicant who complies with the other statutory requirements is entitled to a patent. 35 U.S.C.A. § 103.

**[2] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

On appeal to Board of Patent Appeals and Interferences, patent applicant can overcome a rejection on grounds of obviousness by showing insufficient evidence of prima facie obviousness or by rebutting prima facie case with evidence of secondary indicia of nonobviousness. 35 U.S.C.A. § 103.

**[3] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

While Court of Appeals reviews determination of obviousness by Board of Patent Appeals and Interferences in light of entire record, patent applicant may specifically challenge an obviousness rejection by showing that Board reached an incorrect conclusion of obviousness or that Board based its obviousness determination on incorrect factual predicates.

**[4] Patents 291 ☞ 113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

Court of Appeals reviews ultimate determination of obviousness by Board of Patent Appeals and Interferences as a question of law.

**[5] Patents 291 ☞ 16(2)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(2) k. Prior Art in General. Most Cited Cases**Patents 291 ☞ 16.5(1)**291 Patents291II Patentability291II(A) Invention; Obviousness

291k16.5 State of Prior Art and Advancement Therein291k16.5(1) k. In General. Most Cited Cases

The factual predicates underlying an obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art. 35 U.S.C.A. § 103.

**[6] Patents 291 ☞113(6)**291 Patents291IV Applications and Proceedings Thereon291k113 Appeals from Decisions of Commissioner of Patents291k113(6) k. Review on Appeal in General. Most Cited Cases

Court of Appeals reviews factual findings of Board of Patent Appeals and Interferences for clear error, and finding is clearly erroneous when, although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.

**[7] Patents 291 ☞36.1(2)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.1 Secondary Factors Affecting Invention or Obviousness291k36.1(2) k. Imitation or Copying. Most Cited Cases**Patents 291 ☞36.1(3)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.1 Secondary Factors Affecting Invention or Obviousness291k36.1(3) k. Longstanding Need and Solution to Problems. Most Cited Cases**Patents 291 ☞36.1(4)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.1 Secondary Factors Affecting Invention or Obviousness291k36.1(4) k. Failure of Others. Most Cited Cases**Patents 291 ☞36.2(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k36 Weight and Sufficiency291k36.2 Commercial Success291k36.2(1) k. In General. Most Cited Cases

Objective evidence of invention's nonobviousness includes copying, long felt but unsolved need, failure of others, commercial success, unexpected results created by the claimed invention, unexpected properties of the claimed invention, licenses showing industry respect for the invention, and skepticism of skilled artisans before the invention. 35 U.S.C.A. § 103.

**[8] Patents 291 ☞97**291 Patents291IV Applications and Proceedings Thereon291k97 k. Patent Office and Proceedings Therein in General. Most Cited Cases

Board of Patent Appeals and Interferences must consider all of patent applicant's evidence in determining whether claimed invention is obvious. 35 U.S.C.A. § 103.

**[9] Patents 291 ☞314(5)**291 Patents291XII Infringement291XII(C) Suits in Equity291k314 Hearing291k314(5) k. Questions of Law or Fact. Most Cited Cases

Whether the evidence presented suffices to rebut the prima facie case of obviousness is part of the ultimate conclusion of obviousness and is therefore a question of law. 35 U.S.C.A. § 103.

**[10] Patents 291 ☞16.5(1)**

291 Patents291II Patentability291II(A) Invention; Obviousness291k16.5 State of Prior Art and Advancement Therein291k16.5(1) k. In General. Most Cited Cases

When rejection of patent application for obviousness depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references. 35 U.S.C.A. § 103.

**[11] Patents 291 ↪ 26(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k26 Combination291k26(1) k. In General. Most Cited Cases

When determining the patentability of a claimed invention which combines two known elements, the question in determining issue of obviousness is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. 35 U.S.C.A. § 103.

**[12] Patents 291 ↪ 26(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k26 Combination291k26(1) k. In General. Most Cited Cases

Combination of two prior art patents and conference report did not render obvious invention claiming satellite technology to reduce number of necessary "handovers" between beams transmitted by single satellite, even if combination of references contained all elements claimed in patent application, absent any evidence of motivation to combine such references other than high level of skill in the relevant art. 35 U.S.C.A. § 103.

**[13] Patents 291 ↪ 16(3)**291 Patents291II Patentability291II(A) Invention; Obviousness291k16 Invention and Obviousness in General291k16(3) k. View of Person Skilled in Art. Most Cited Cases

Obviousness is determined from vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains, which is construct akin to "reasonable person" used as reference in negligence determinations and presumes that all prior art references in the field of the invention are available to hypothetical skilled artisan. 35 U.S.C.A. § 103(a).

**[14] Patents 291 ↪ 26(1)**291 Patents291II Patentability291II(A) Invention; Obviousness291k26 Combination291k26(1) k. In General. Most Cited Cases

Combination of prior art patents relating to cellular communications systems did not render obvious invention claiming satellite technology to reduce number of necessary "handovers" between beams transmitted by single satellite, absent identification of specific principle providing motivation to combine those prior art references. 35 U.S.C.A. § 103.

**Patents 291 ↪ 328(2)**291 Patents291XIII Decisions on the Validity, Construction, and Infringement of Particular Patents291k328 Patents Enumerated291k328(2) k. Original Utility. Most Cited Cases

4,872,015, 5,170,485, 5,199,672, 5,394,561. Cited as prior art.

\*1352 Richard C. Turner and Grant K. Rowan, Sughrue, Mion, Zinn, Macpeak & Seas, PLLC, Washington, DC, argued for appellants.

David J. Ball, Jr., Associate Solicitor, Office of the Solicitor, Patent and Trademark Office, Arlington, Virginia, argued for appellee. With him on the brief were Nancy J. Linck, Solicitor, Albin F. Drost, Deputy Solicitor, and Craig R. Kaufman, Associate Solicitor. Of counsel was Scott A. Chambers, Associate Solicitor, Office of the Solicitor.

Before PLAGER, Circuit Judge, ARCHER, Senior Circuit Judge, and RADER, Circuit Judge.

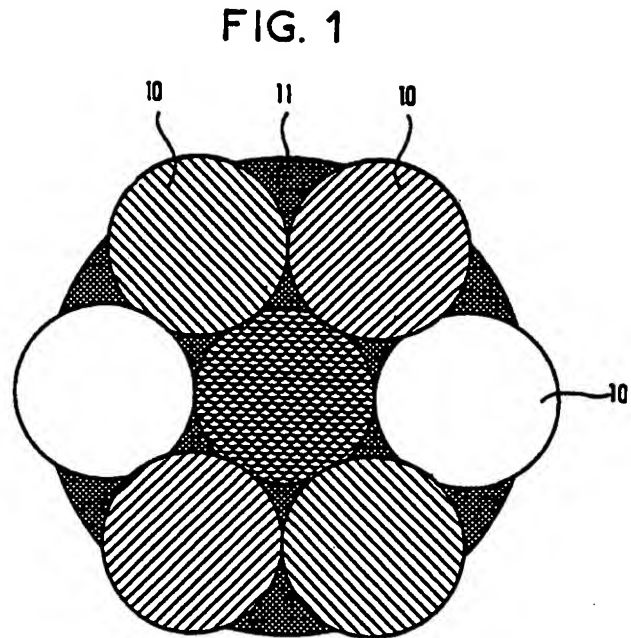
RADER, Circuit Judge.

Denis Rouffet, Yannick Tanguy, and Frédéric Bethault (collectively, Rouffet) submitted application 07/888,791 (the application) on May 27, 1992. The Board of Patent Appeals and Interferences (the Board) affirmed final rejection of the application as obvious under 35 U.S.C. § 103(a). See *Ex parte Rouffet*, No. 96-1553 (Bd. Pat.App. & Int. Apr. 16, 1997). Because the Board reversibly erred in identifying a motivation to combine the references, this court reverses.

# I.

Satellites in a geosynchronous or geostationary orbit remain over the same point on the Earth's surface. Their constant position above the Earth's surface facilitates communications. These satellites project a number of beams to the Earth. Each beam transmits to its area of coverage, or footprint, on the Earth's surface. In order to provide complete coverage, adjacent footprints overlap slightly and therefore must use different frequencies to avoid interference. However, two or more non-overlapping footprints can use the same set of frequencies in order to use efficiently the limited radio spectrum. Figure 1 from the application shows the coverage of a portion of the Earth's surface provided by multiple cone shaped beams:

**\*1353 FIG. 1**

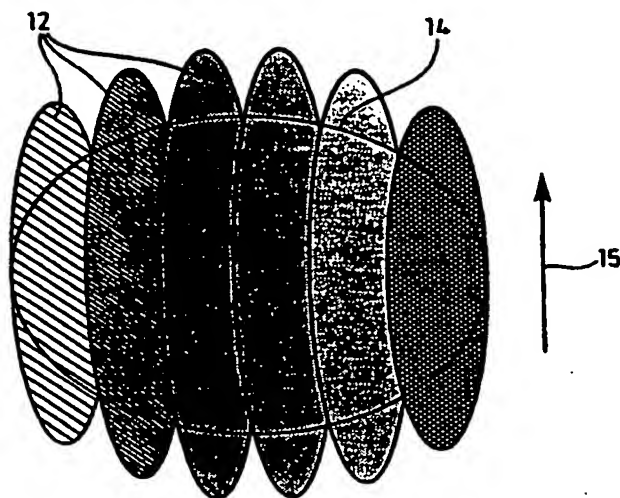


Frequency reuse techniques, however, have a limited ability to compensate for congestion in geostationary orbits. To alleviate the orbit congestion problem, new telecommunications systems use a network of satellites in low Earth orbit. When viewed from a fixed point on the Earth's surface, such satellites do not remain stationary but move overhead. A satellite's motion as it transmits a plurality of cone-shaped beams creates a new problem. The satellite's movement causes a receiver on the Earth's surface to move from the footprint of one beam into a second beam transmitted by the same satellite. Eventually, the satellite's motion causes the receiver to move from the footprint of a beam transmitted by one satellite into the footprint of a beam transmitted by a second satellite. Each switch from one footprint to another creates a "handover" event analogous to that which occurs when a traditional cellular phone travels from one cell to another. Handovers are undesirable because they can cause interruptions in signal transmission and reception.

Rouffet's application discloses technology to reduce the number of handovers between beams transmitted by the same satellite. In particular, Rouffet eliminates handovers caused solely by the satellite's motion. To accomplish this

goal, Rouffet changes the shape of the beam transmitted by the satellite's antenna. Rouffet's satellites transmit fan-shaped beams. A fan beam has an elliptical footprint. Rouffet aligns the long axis of his beams parallel to the direction of the satellite's motion across the Earth's surface. By elongating the beam's footprint in the direction of satellite travel, Rouffet's invention ensures that a fixed point on the Earth's surface likely will remain within a single footprint until it is necessary to switch to another satellite. Because Rouffet's invention does not address handovers caused by the motion of the receiver across the Earth's \*1354 surface, his arrangement reduces, but does not eliminate, handovers. Figure 3 from the application shows the footprints 12 from six beams aligned in the direction of satellite motion 15:

FIG. 3



The application contains ten claims that stand or fall as a group. Claim 1 is representative:

A low orbit satellite communications system for mobile terminals, wherein the communications antenna system of each satellite provides isoflux coverage made up of a plurality of fan beams that are elongate in the travel direction of the satellite.

The examiner initially rejected Rouffet's claims as unpatentable over U.S. Pat. No. 5,199,672 (King) in view of U.S. Pat. No. 4,872,015 (Rosen) and a conference report entitled

"A Novel Non-Geostationary Satellite Communications System," *Conference Record*, International Conference on Communications, 1981 (Ruddy). On appeal to the Board, the examiner added an alternative ground for rejection, holding that the claims were obvious over U.S. Pat. No. 5,394,561 (Freeburg) in view of U.S. Pat. No. 5,170,485 (Levine).

On April 16, 1997, the Board issued its decision. Because Rouffet had specified that the claims would stand or fall as a group based on the patentability of claim 1, the Board limited its opinion to that claim. The Board unanimously determined that the examiner had properly rejected claim 1 as obvious over King in view of Rosen and Ruddy. The Board, on a split vote, also affirmed the rejection over Freeburg in view of Levine.

## \*1355 II

[1][2] To reject claims in an application under section 103, an examiner must show an un rebutted *prima facie* case of obviousness. See In re Deuel, 51 F.3d 1552, 1557, 34 U.S.P.Q.2d 1210, 1214 (Fed.Cir.1995). In the absence of a proper *prima facie* case of obviousness, an applicant who complies with the other statutory requirements is entitled to a patent. See In re Oetiker, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed.Cir.1992). On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness. See *id.*

[3][4][5][6] While this court reviews the Board's determination in light of the entire record, an applicant may specifically challenge an obviousness rejection by showing that the Board reached an incorrect conclusion of obviousness or that the Board based its obviousness determination on incorrect factual predicates. This court reviews the ultimate determination of obviousness as a question of law. See In re Lueders, 111 F.3d 1569, 1571, 42 U.S.P.Q.2d 1481, 1482 (Fed.Cir.1997). The factual predicates underlying an obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art. See Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH,



139 F.3d 877, 881, 45 U.S.P.Q.2d 1977, 1981 (Fed.Cir.1998). This court reviews the Board's factual findings for clear error. See *In re Zurko*, 142 F.3d 1447, 1449, 46 U.S.P.Q.2d 1691, 1693 (Fed.Cir.1998) (in banc); *Lueders*, 111 F.3d at 1571-72. " 'A finding is clearly erroneous when, although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.' " *In re Graves*, 69 F.3d 1147, 1151, 36 U.S.P.Q.2d 1697, 1700 (Fed.Cir.1995) (quoting *United States v. United States Gypsum Co.*, 333 U.S. 364, 395, 68 S.Ct. 525, 92 L.Ed. 746 (1948)).

[7][8][9] The secondary considerations are also essential components of the obviousness determination. See *In re Emert*, 124 F.3d 1458, 1462, 44 U.S.P.Q.2d 1149, 1153 (Fed.Cir.1997) ("Without Emert providing rebuttal evidence, this *prima facie* case of obviousness must stand."). This objective evidence of nonobviousness includes copying, long felt but unsolved need, failure of others, see *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966), commercial success, see *In re Huang*, 100 F.3d 135, 139-40, 40 U.S.P.Q.2d 1685, 1689-90 (Fed.Cir.1996), unexpected results created by the claimed invention, unexpected properties of the claimed invention, see *In re Mayne*, 104 F.3d 1339, 1342, 41 U.S.P.Q.2d 1451, 1454 (Fed.Cir.1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 U.S.P.Q.2d 1934, 1936-37 (Fed.Cir.1990), licenses showing industry respect for the invention, see *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957, 43 U.S.P.Q.2d 1294, 1297 (Fed.Cir.1997); *Pentec, Inc. v. Graphic Controls Corp.*, 776 F.2d 309, 316, 227 U.S.P.Q. 766, 771 (Fed.Cir.1985), and skepticism of skilled artisans before the invention, see *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1532 (Fed.Cir.1988). The Board must consider all of the applicant's evidence. See *Oetiker*, 977 F.2d at 1445 ("An observation by the Board that the examiner made a *prima facie* case is not improper, as long as the ultimate determination of patentability is made on the entire record."); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed.Cir.1984). The court reviews factual conclusions drawn from this evidence for clear error. Whether the evidence presented suffices to rebut the *prima facie* case is part of the ultimate conclusion of obviousness

and is therefore a question of law.

[10][11] When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references. See *In re Geiger*, 815 F.2d 686, 688, 2 U.S.P.Q.2d 1276, 1278 (Fed.Cir.1987). Although the suggestion to combine references may flow from the nature of the problem, see *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 U.S.P.Q.2d 1626, 1630 (Fed.Cir.1996), the suggestion more often comes from the teachings of the pertinent references, see *In re Sernaker*, 702 F.2d 989, 994, 217 U.S.P.Q. 1, 5 (Fed.Cir.1983), or from the ordinary knowledge of those skilled in the art that certain references are of special importance\*1356 in a particular field, see *Pro-Mold*, 75 F.3d at 1573 (citing *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 n. 24, 227 U.S.P.Q. 657, 667 n. 24 (Fed.Cir.1985)). Therefore, "[w]hen determining the patentability of a claimed invention which combines two known elements, 'the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.' " See *In re Beattie*, 974 F.2d 1309, 1311-12, 24 U.S.P.Q.2d 1040, 1042 (Fed.Cir.1992) (quoting *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 U.S.P.Q. 481, 488 (Fed.Cir.1984)).

### III

The parties agree that the five references asserted by the examiner are in the same field of endeavor as the invention. The parties also agree that the pertinent level of skill in the art-design of satellite communications systems-is high. On appeal, Rouffet asserts that the examiner and the Board erred by improperly combining references to render the claimed invention obvious.

#### *The Combination of King, Rosen, and Ruddy*

[12] The Board first affirmed the rejection of Rouffet's claims over a combination of King, Rosen, and Ruddy. King discloses a system for launching a plurality of satellites into low Earth orbits from a single launch vehicle. Rosen teaches a geostationary satellite that uses a plurality of fan beams with their long axes oriented in an east-west direction to

communicate with mobile and fixed terminals on the Earth.

The final, and most important, reference in this combination is Ruddy. Ruddy describes a television broadcast system that uses a series of satellites to retransmit signals sent from a ground station over a wide area. Rather than using a geostationary orbit, Ruddy teaches the use of a series of satellites in Molniya orbits. A satellite in a Molniya orbit always follows the same path through the sky when viewed from a fixed point on the ground. Viewed from the Earth, the orbital path includes a narrow, elliptical apogee loop. In order to transmit to these moving satellites from a ground station, Ruddy uses a fan beam with a long axis aligned with the long axis of the orbit's apogee loop. This alignment places the entire apogee loop within the footprint of the beam and eliminates the need for the ground station's antenna to track the satellite's motion around the apogee loop. Ruddy further teaches orbit parameters and spacing of multiple satellites to ensure that a satellite is always in the loop to receive and rebroadcast signals from the Earth station.

King and Rosen together teach the use of a network of satellites in low Earth orbit. Thus, Ruddy becomes the piece of the prior art mosaic that shows, in the reading of the Board, the use of "a plurality of fan beams that are elongate in the travel direction of the satellite." Ruddy, however, is different from the claimed invention in several respects. Specifically, the application claims the projection of multiple elliptical fan-shaped footprints from the satellite to the ground. *See* Claim 1, *supra*, *see also* Application at 6, lines 9-11 ("In addition, in this system, the geometrical shape of the beams 12 is changed: instead of being circular they are now elongate ellipses."). The application's written description further teaches that the invention's fan-shaped satellite beams will minimize handovers. *See id.* at lines 11-16 ("This considerably increases call durations between handovers.").

In contrast, Ruddy teaches that a ground station may use a single fan-shaped beam to transmit to a satellite in a unique Molniya orbit. The ground station transmits a beam into which a series of satellites in Molniya orbits will successively enter. At least two differences are evident: the application teaches projection of multiple beams from a satellite to the Earth, while Ruddy teaches projection of a single beam

from the Earth to satellites. Moreover to the extent Ruddy contains a teaching about handovers, its teachings focus on use of the unique Molniya orbit to ensure that a satellite always falls within the beam transmitted by the ground station.

These differences suggest some difficulty in showing a *prima facie* case of obviousness. The Board, however, specifically found that artisans of ordinary skill in this field of art would know to shift the frame of reference from a ground station following a satellite to a satellite transmitting to the ground. According proper deference to the Board's finding\*1357 of a lofty skill level for ordinary artisans in this field, this court discerns no clear error in the Board's conclusion that these differences would not preclude a finding of obviousness. While Ruddy does not expressly teach alignment of the fan beam with the apparent direction of the satellite's motion, this court perceives no clear error in the Board's determination that Ruddy would suggest such an alignment to one of skill in this art. Therefore, the Board did not err in finding that the combination of King, Rosen, and Ruddy contains all of the elements claimed in Rouffet's application.

However, the Board reversibly erred in determining that one of skill in the art would have been motivated to combine these references in a manner that rendered the claimed invention obvious. Indeed, the Board did not identify any motivation to choose these references for combination. Ruddy does not specifically address handover minimization. To the extent that Ruddy at all addresses handovers due to satellite motion, it addresses this subject through the selection of orbital parameters. Ruddy does not teach the choice of a particular shape and alignment of the beam projected by the satellite. Thus Ruddy addresses the handover problem with an orbit selection, not a beam shape. The Board provides no reasons that one of ordinary skill in this art, seeking to minimize handovers due to satellite motion, would combine Ruddy with Rosen and King in a manner that would render the claimed invention obvious.

[13] Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains. *See* 35 U.S.C. § 103(a). This legal construct is akin to the "reasonable person" used as a reference

in negligence determinations. The legal construct also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan. See In re Carlson, 983 F.2d 1032, 1038, 25 U.S.P.Q.2d 1207, 1211 (Fed.Cir.1993).

As this court has stated, "virtually all [inventions] are combinations of old elements." Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 698, 218 U.S.P.Q. 865, 870 (Fed.Cir.1983); see also Richdel, Inc. v. Sunspool Corp., 714 F.2d 1573, 1579-80, 219 U.S.P.Q. 8, 12 (Fed.Cir.1983) ("Most, if not all, inventions are combinations and mostly of old elements."). Therefore an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be "an illogical and inappropriate process by which to determine patentability." Sensonic, Inc. v. Aerosonic Corp., 81 F.3d 1566, 1570, 38 U.S.P.Q.2d 1551, 1554 (Fed.Cir.1996).

To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.

This court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. In this case, the Board relied upon none of these. Rather, just as it relied on the high level of skill in the art to overcome the differences between the claimed invention and the selected elements in the references, it relied upon the high level of skill in the art to provide the necessary motivation. The Board did not,

however, explain what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination. Instead, the Board merely invoked the high level of skill in the field of art. If such a rote invocation could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance. Instead, in complex scientific fields, the Board could routinely identify the prior art elements in an application, invoke the lofty level of skill, and rest its case for rejection. To counter this potential weakness in the obviousness\*1358 construct, the suggestion to combine requirement stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.

Because the Board did not explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of Rouffet's invention to make the combination, this court infers that the examiner selected these references with the assistance of hindsight. This court forbids the use of hindsight in the selection of references that comprise the case of obviousness. See In re Gorman, 933 F.2d 982, 986, 18 U.S.P.Q.2d 1885, 1888 (Fed.Cir.1991). Lacking a motivation to combine references, the Board did not show a proper *prima facie* case of obviousness. This court reverses the rejection over the combination of King, Rosen, and Ruddy.

#### *The Combination of Freeburg and Levine*

[14] Freeburg teaches a cellular radiotelephone system based on a constellation of low Earth orbit satellites that use conical beams to transmit from the satellite to both fixed and mobile Earth stations. Levine teaches an Earth-based cellular radio system that uses fan beams broadcast from antenna towers. Levine's elliptical footprints are aligned with the road grid. To increase the capacity of traditional ground-based systems through frequency reuse techniques, Levine teaches the use of antennas that broadcast signals with smaller footprints than the prior art system. Thus, Levine actually increases the number of overlap regions between cells and, hence, the number of potential handovers. Figure 1 of the Levine patent illustrates its alignment of beam footprints:

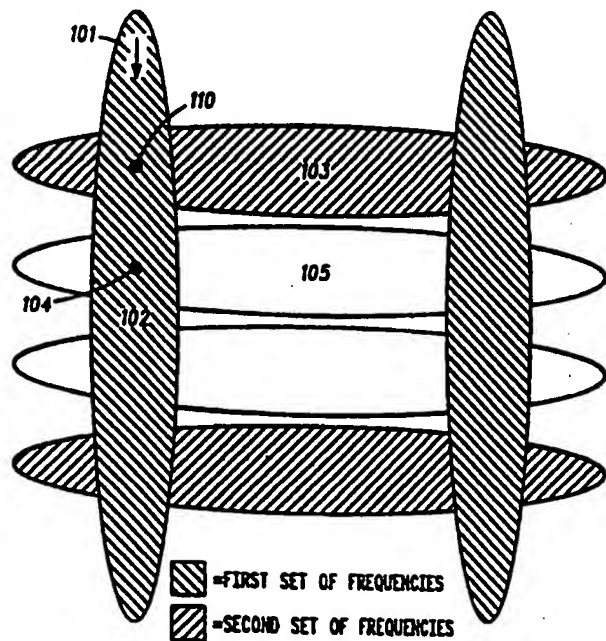


FIG. 1

\*1359 As a mobile unit (e.g., a driver using a car phone) moves through a succession of overlapping zones, Levine uses selection algorithms to determine which of the cells is aligned with the travel direction of the mobile unit. These algorithms then select this cell for use while continually monitoring intersecting cells in the event that the mobile unit changes direction.

Once again, this court notes significant differences between the teachings of the application and the Levine-Freeburg combination. The critical Levine reference again involves a beam from an Earth station without any reference to the "travel direction of [a] satellite." Moreover, Levine actually multiplies the number of potential handovers and then uses software to sort out the necessary handovers from the unnecessary. However, the Board explains the reasons that one possessing the lofty skills characteristic of this field would know to account for the differences between the claimed invention and the prior art combination. This court discerns no clear error in that reliance on the considerable skills in this field.

This court does, however, discern reversible error in the

Board's identification of a motivation to combine Levine and Freeburg. In determining that one of skill in the art would have had motivation to combine Levine and Freeburg, the Board noted that "[t]he level of skill in the art is very high." As noted before, this observation alone cannot supply the required suggestion to combine these references. The Board posits that the high level of skill in the art overcomes the absence of any actual suggestion that one could select part of the teachings of Levine for combination with the satellite system disclosed by Freeburg.

As noted above, the suggestion to combine requirement is a safeguard against the use of hindsight combinations to negate patentability. While the skill level is a component of the inquiry for a suggestion to combine, a lofty level of skill alone does not suffice to supply a motivation to combine. Otherwise a high level of ordinary skill in an art field would almost always preclude patentable inventions. As this court has often noted, invention itself is the process of combining prior art in a nonobvious manner. See, e.g., *Richdel*, 714 F.2d at 1579; *Environmental Designs*, 713 F.2d at 698. Therefore, even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. Cf. *Gechter v. Davidson*, 116 F.3d 1454, 43 U.S.P.Q.2d 1030 (Fed.Cir.1997) (explaining that the Board's opinion must describe the basis for its decision). In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.

The Board's naked invocation of skill in the art to supply a suggestion to combine the references cited in this case is therefore clearly erroneous. Absent any proper motivation to combine part of Levine's teachings with Freeburg's satellite system, the rejection of Rouffet's claim over these references was improper and is reversed.

#### IV

The Board reversibly erred in determining that there was a motivation to combine either the teachings of King, Rosen, and Ruddy or of Freeburg and Levine in a manner that would render the claimed invention obvious. Because this predicate was missing in each case, the Board did not prop-

erly show that these references render the claimed invention obvious. Therefore this court reverses the Board's decision upholding the rejection of Rouffet's claims. In light of this disposition, Rouffet's pending motion to remand the case to the Board for further consideration is denied as moot.

*COSTS*

Each party shall bear its own costs.

*REVERSED.*

C.A.Fed.,1998.

In re Rouffet

149 F.3d 1350, 47 U.S.P.Q.2d 1453

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- [1997 WL 33545154](#) (Appellate Brief) Brief for Appellants in re Rouffet, et al. (Oct. 14, 1997) Original Image of this Document with Appendix (PDF)

END OF DOCUMENT

**XI. RELATED PROCEEDINGS APPENDIX**

None.